ALASKA LEGISLATURE

1435

HOUSE and SENATE FINANCE COMMITTEE FILES, 1995-1996

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96139A2

Project Title: Spawning Channel Construction Project Port Dick Creek, Lower Cook Inlet

Proposer: ADFG

New or Cont'd: Continued

Cluster: Pink Salmon Projects

RPL Request: ADFG $230.5

Total FY 96: $230.5

Cooperating Federal Agencies: None

Project Summary: The proposed Port Dick Pink Salmon Spawning Channel would restore wild pink and chum salmon stocks. The proposed project would increase the spawning habitat available in Port Dick Creek by restoring formerly used tributaries by excavating down to stable water sources.

Chief Scientist's Recommendation: Implementation of this proposal will likely enhance pink salmon production, and contains plans to monitor performance of the modified channel. It had been previously approved in 1995.

Trustee Council Action: Fund. Project is intended to increase available spawning habitat and thus provide additional pink and chum salmon for harvest as a replacement for salmon lost in the oil spill.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96149

Project Title: Archaeological Site Stewardship

Proposer:	ADNR		**New or Cont'd:**	NEW
			Cluster:	Archaeological Resources
RPL Request:	ADNR	$54.1		
Total FY 96:	$74.4		**Cooperating Federal Agencies:**	DOI

Project Summary: The archaeological site stewardship program will provide training and coordination for a cadre of volunteers to monitor vandalized archaeological sites in the oil spill area beyond the ability of agency monitoring. Volunteer site stewards will protect damaged sites in Kachemak Bay, Uganik Bay, Uyak Bay and the Chignik area of the Alaska Peninsula. Further protection will come from increased local awareness of harm from site vandalism.

Chief Scientist's Recommendation: The concept was favorably reviewed. This project could serve as a useful model for protection of sites by local residents.

Trustee Council Action: Fund. The project will provide training and coordination for volunteers to monitor vandalized archaeological sites in the oil spill area. This effort is currently beyond the ability of agency monitoring. After FY 98, expenses will be assumed either by volunteer stewards or agency budgets.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96154

Project Title: Comprehensive Community Plan for Restoration of Archaeological Resources in PWS and Lower Cook Inlet

Proposer:	Chugach Heritage Foundation	**New or Cont'd:**	NEW
		Cluster:	Archaeological Resources
RPL Request:	ADNR $9.6		
		Cooperating Federal Agencies:	
Total FY 96:	$206.3		USFS, DOI

Project Summary: This project would provide coordinated and cost-effective approach to the provision and delivery of technical assistance planning services to each of the Chugach Oil Spill Impacted Region communities engaged in the development of a cultural center or subsistence restoration facility. The project is designed to facilitate a region-wide effort, coordinate and provide for the various technical service elements associated with and essential to the planning and development of community cultural centers or subsistence restoration facilities and their attendant long-term programs.

Chief Scientist's Recommendation: A well presented and complete proposal for local restoration of archaeological resources affected by the spill, concentrating on storage and display of artifacts in the spill area. I recommend this planning effort.

Trustee Council Action: Fund. Project description has been revised to reflect a comprehensive community planning effort.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96162

Project Title: Investigations of Disease Factors Affecting Declines of Pacific Herring Populations in Prince William Sound, AK

Proposer:	University of California, Univeristy of Washington, Simon Fraser Universitv	**New or Cont'd:**	Continued
		Cluster:	Herring Projects
RPL Request:	ADFG $204.1		
Total FY 96:	$635.0	**Cooperating Federal Agencies:**	None

Project Summary: Field and laboratory studies will focus on Viral Hemorrhagic Septicemia (VHS) and *Ichthyophonus hoferi*, a pathogenic fungus, to determine their role in the disease and mortality observed in PWS herring since 1993. Herring in PWS will be monitored three times per year for signs of disease and immune status. Specific pathogen-free herring will be used to determine the degree of mortality, blood chemical changes and pathogenicity produced by these organisms alone and in combination with exposure to stressors such as petroleum hydrocarbons, temperature and crowding. (This project was formerly numbered 95320S.)

Chief Scientist's Recommendation: This is an innovative and thorough approach to investigating the potential relationship between oil exposure and manifestation of disease in herring, although the time between the spill and the population crashes raises questions about cause and effect. Nevertheless, there is a plausible basis for the questions being addressed by this work. By exposing pathogen-free herring to oil and challenge by VHS virus and *Ichthyophonus* in laboratory experiments, the role of these pathogens in the population crashes will be clarified. Also, learning more about the circumstances of disease transmission may benefit herring management.

Trustee Council Action: Defer until FY 95 results are evaluated (fund interim). Project is designed to investigate potential link between oil exposure and disease and between disease and the population decline in PWS. Understanding the lack of recovery is important for restoration and resumption of a herring fishery.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96163C

Project Title: Fish Diet Overlap Using Fish Stomach Content Analysis

Proposer:	Duffy, et. al.	**New or Cont'd:**	Continued
		Cluster:	Seabird/Forage Fish Ecosystem Project
RPL Request:	ADFG $21.5		
		Cooperating Federal Agencies:	
Total FY 96:	$133.1		NOAA

Project Summary: Part of Project 96163 (Seabird-Forage Fish/APEX). This study will use seabirds as "probes" of the trophic environment of PWS and compare their reproductive and foraging biologies with similar measurements from the Barren Islands, an area with more suitable or abundant food. Measurements will be compared with hydroacoustic and net samples of fish to calibrate seabird performance with fish distribution and abundance. The project will use fish samples to compare diet, energetics and reproductive parameters of different forage-fish species to determine whether competitive and predatory interactions or different responses to the environment may be favoring the abundance of one fish species over another.

Chief Scientist's Recommendation: Project to be subject of detailed review in November 1995, as voted by the Trustee Council in approving the FY 95 startup of this project.

Trustee Council Action: Provide interim funding only. Defer remainder pending project review with the Chief Scientist. Project addresses the "is it food?" hypothesis for several seabird species that are in continuing decline. This information could help inform future fisheries management decisions, particularly if commercial interest in fisheries for capelin and other small, oil-rich species was to emerge.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96163L

Project Title: Historical Review of Ecosystem Structure in the PWS/GOA Complex and Abundance and Distribution of Forage Fish in the Barren Islands

Proposer: Duffy, et. al.

New or Cont'd: Continued

Cluster: Seabird/Forage Fish Ecosystem Project

RPL Request: ADFG $4.8

Total FY 96: $73.3

Cooperating Federal Agencies: DOI, NOAA

Project Summary: Part of Project 96163 (Seabird-Forage Fish/APEX). This study will use seabirds as "probes" of the trophic environment of PWS and compare their reproductive and foraging biologies with similar measurements from the Barren Islands, an area with more suitable or abundant food. Measurements will be compared with hydroacoustic and net samples of fish to calibrate seabird performance with fish distribution and abundance. The project will use fish samples to compare diet, energetics and reproductive parameters of different forage-fish species to determine whether competitive and predatory interactions or different responses to the environment may be favoring the abundance of one fish species over another.

Chief Scientist's Recommendation: Project to be subject of detailed review in November 1995, as voted by the Trustee Council in approving the FY 95 startup of this project.

Trustee Council Action: Provide interim funding only. Defer remainder pending project review with the Chief Scientist. Project addresses the "is it food?" hypothesis for several seabird species that are in continuing decline. This information could help inform future fisheries management decisions, particularly if commercial interest in fisheries for capelin and other small, oil-rich species was to emerge.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96164

Project Title: Pacific Herring Program Leadership

Proposer:	ADFG	New or Cont'd:	NEW
		Cluster:	Herring Projects
RPL Request:	ADFG $49.2		
		Cooperating Federal Agencies:	
Total FY 96:	$49.2		None

Project Summary: The purpose of this project is to enhance coordination, integration and critical review of projects that are designed to study different aspects of Pacific herring in the PWS ecosystem; to better understand the interactions of the components of the ecosystem; and to aid in the recovery of the injured resource and lost services.

Chief Scientist's Recommendation: As revised, this proposal provides the leadership the herring research program deserves.

Trustee Council Action: Fund. Increased leadership should increase the effectiveness of the EVOS herring program. Note that the balance of funds needed to hire a program leader should come from 96162, 96165, and 96166. It is unlikely this project will transition into normal agency management. In future years, funding will be rolled into other herring projects.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96165

Project Title: Genetic Discrimination of Prince William Sound Herring Populations

Proposer:	ADFG	**New or Cont'd:**	Continued
		Cluster:	Herring Projects
RPL Request:	ADFG $103.9		
		Cooperating Federal Agencies:	
Total FY 96:	$103.9		None

Project Summary: The PWS herring fishery has been in catastrophic decline since 1992. The Alaska Department of Fish and Game recovery effort includes incorporating a knowledge of genetically derived population structure into harvest management. This continuing project will delineate the structure of PWS population(s) and related North Pacific populations using both nuclear and mitochondrial DNA analyses. Tests for temporal and spatial diversity within years and temporal stability across years will be done.

Chief Scientist's Recommendation: This is a continuing project that will directly affect issues of importance for managing Prince William Sound herring. The investigators have performed admirably on past projects, and I recommend further support for the project in 1996.

Trustee Council Action: Fund. This project addresses basic questions about the genetic composition of PWS herring in relation to other North Pacific populations. This information is important to management. When setting harvest limits, it is important to know whether there exists one or more genetically distinct populations.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96166

Project Title: Herring Natal Habitats

Proposer:	ADFG		**New or Cont'd:**	Continued
			Cluster:	Herring Projects
RPL Request:	ADFG	$229.9		
Total FY 96:	$444.1		**Cooperating Federal Agencies:**	None

Project Summary: Past studies have documented damage from oil exposure in adult herring, hatching success of embryos, and levels of physical and genetic abnormalities in larvae. The PWS herring spawning population has drastically declined since 1993, and pathology studies implicated Viral Hemorrhagic Septicemia (VHS) and *Ichthyophonus* as potential sources of mortality as well as indicators of stress. The project will continue to provide estimates of spawning herring abundance and investigate the lethality of suspected pathogens and the role of environmental contaminants in disease transmission through laboratory and field studies.

Chief Scientist's Recommendation: Relates to SEA hypothesis and causes of decline in herring, which are fundamental to the EVOS restoration program. However, there is concern about the extent to which some activities can be considered on-going agency management. The budget is too high.

Trustee Council Action: Defer pending 1) review of FY 95 results; 2) a review of recovery objective for herring based on FY 95 results; 3) a review of the project budget; and 4) agreement on plan for transition to normal agency management. In addition, there is a question whether herring spawn deposition surveys are a cost-effective management tool (juvenile herring survey may be more effective). Fund interim. The goal of the project is to improve estimation of spawning biomass, in order to establish harvest levels and guidelines that allow natural restoration to occur and that will sustain a healthy fishery.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96170

Project Title: Isotope Ratio Studies of Marine Mammals in Prince William Sound

Proposer:	Schell, University of Alaska/Fairbanks	**New or Cont'd:**	Continued
		Cluster:	Marine Mammal Program
RPL Request:	ADFG $150.4		
		Cooperating Federal Agencies:	None
Total FY 96:	$150.4		

Project Summary: Stable isotope ratios are natural tracers of carbon and nitrogen transfers through food webs. Through a mix of captive animal studies, comparison of isotope ratios in archived and current marine mammal tissues and their potential prey species in the PWS, insight into environmental changes causing the decline of harbor seals may be possible. This project will supply the isotope ratio determinations for other projects using this technique in the PWS ecosystem. Over the 12 months of FY 96 funding about 10,000 samples in these related projects will be analyzed. (This project was formerly numbered 95320I2.)

Chief Scientist's Recommendation: Excellent in all respects. This project will doubtlessly provide insights into the functioning of the Prince William Sound ecosystem that cannot be obtained in other ways. It may well provide valuable information for modeling the entire ecosystem at a very reasonable cost. Coordination with Project 96121 should prevent duplication of effort.

Trustee Council Action: Fund. This project provides technical support for 96064, and will assist the SEA program (96320) by describing the food chains that support important commercial fisheries in PWS.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96180

Project Title: Kenai Habitat Restoration & Recreation Enhancement Project

Proposer:	ADNR		**New or Cont'd:**	NEW
			Cluster:	Habitat Improvements
RPL Request:	ADFG	$281.0		
	ADNR	$241.9		
			Cooperating Federal Agencies:	DOI
Total FY 96:	$560.6			

Project Summary: Adverse impacts to the banks of the Kenai River total approximately 19 miles of the river's 166 mile shoreline. Included in this total are 5.4 river miles of degraded shoreline on public land. Riparian habitats have been impacted by trampling, vegetation loss and structural development. This riparian zone provides important habitat for pink salmon, sockeye salmon and Dolly Varden, species injured by the *Exxon Valdez* oil spill. The project's objectives are to restore injured fish habitat, protect fish and wildlife habitat, enhance and direct recreation and preserve the values and biophysical functions that the riparian habitat contributes to the watershed.

Chief Scientist's Recommendation: This is a well presented proposal, and the supplementary information provided helps to clarify the relationship to work that is being carried out with funds provided from the *Exxon Valdez* criminal settlement and other sources. This is a strong project aimed at the direct restoration of habitats that are important to the recovery of sockeye and other fish species of commercial and recreational importance.

Trustee Council Action: Fund. This project will aid restoration of habitat for the benefit of sockeye salmon and other fish species of commercial and recreational importance.

EXXON VALDEZ OIL SPILL -- FY 96 WORK PLAN
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Project Number: 96186

Project Title: Coded Wire Tag Recoveries From Pink Salmon in Prince William Sound

Proposer: ADFG

New or Cont'd: Continued

Cluster: Pink Salmon Projects

RPL Request: ADFG $254.9

Total FY 96: $254.9

Cooperating Federal Agencies: None

Project Summary: This project funds recovery of coded-wire tags in PWS pink salmon. The recovered tags are used to help ADFG manage the commercial fishery to protect injured stocks. The project is part of a program to transition to a more precise in-season tool, otolith marking, with a permanent funding source other than the Trustee Council. (This project was formerly numbered 95320B.)

Chief Scientist's Recommendation: This project is necessary to support the transition to the otolith thermal mass marking. This project should be discontinued only after feasibility of TMM is demonstrated.

Trustee Council Action: Fund. Future years' funding, as recommended, includes two years of overlap with Otolith Thermal Marking Project (96188).The project provides information that allows managers to vary the timing and location of commercial harvest to protect injured wild stocks. This is especially important for stocks in the hard-hit Southwest District in PWS and would enable continued fishing in this area.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96188

Project Title: Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in Prince William Sound

Proposer: ADFG

New or Cont'd: Continued

Cluster: Pink Salmon Projects

RPL Request: ADFG $93.2

Total FY 96: $93.2

Cooperating Federal Agencies: None

Project Summary: This project will develop otolith mass marking as an in-season stock separation tool for pink salmon in PWS. In-season stock composition data is used by fishery managers to protect damaged wild pink salmon stocks from overharvest in mixed-stock fisheries. Coded-wire tags are presently used for this purpose in the Sound. Transitioning to otolith marking will reduce costs and increase precision. (This project was formerly numbered 95320C.)

Chief Scientist's Recommendation: This is the continuation of a previously approved program. It is innovative, cost effective, and probably one of the most effective steps the Trustees can support to improve pink salmon management.

Trustee Council Action: Fund. Otolith marking is a more accurate and less expensive technology for providing the information now obtained through coded wire tags. Future years' funding, as recommended, includes two years of overlap with Coded Wire Tag (Project 96186). Funding for application of this technique will make a transition to non-Trustee sources by FY 99 (only closeout funds proposed in '99).

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96191A

Project Title: Oil-Related Embryo Mortalities in PWS Pink Salmon Populations

Proposer: ADFG

New or Cont'd: Continued

Cluster: Pink Salmon Projects

RPL Request: ADFG $389.5

Total FY 96: $474.6

Cooperating Federal Agencies: None

Project Summary: Elevated embryo motalities were detected in populations of pink salmon inhabiting oiled streams following the oil spill. The purpose of this project is to continue to monitor the recovery of pink salmon embryos in the field, provide laboratory verification of the field results, and verify and identify the occurrence of genetic damages. Results of these studies may provide the first evidence of heritable injury in fish exposed to chronic or acute sources of oil pollution.

Chief Scientist's Recommendation: The assessment of embryo survival in the field is worthwhile to verify the 1994 result that no survival difference exists between oiled and unoiled streams for even-year pink salmon. However, the search for microlesions in the genome of injured pink salmon, through employing a variety of the latest genetic techniques, may not be able to detect these very rare events in the many possible locations for such mutations. The molecular genetics should not go forward in FY 96 until the results from FY 95 have been reviewed in the fall. If the adults from the 1994 brood year that were exposed as eggs do not produce a f2 generation, then only closeout funding should be provided.

Trustee Council Action: Fund ongoing component of project. Interim funding only on molecular genetics component of project. Decision on further molecular genetics work pending further review of all pink salmon proposals addressing genetics/straying/stock idenfitication questions.This project monitors potential on-going injury to and recovery of pink salmon and explores the hypothesis that oil spill injury is being passed on genetically.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96196

Project Title: Genetic Structure of Prince William Sound Pink Salmon

Proposer:	ADFG	**New or Cont'd:**	Continued
		Cluster:	Pink Salmon Projects
RPL Request:	ADFG $71.3		
		Cooperating Federal Agencies:	
Total FY 96:	$178.5		None

Project Summary: Previous work found that wild-stock pink salmon suffered both direct lethal and sublethal injuries as a result of the oil spill. An understanding of the population structure of pink salmon in PWS is essential to assess the impact of these injuries on a population basis and to devise and implement management strategies for restoration. This project is designed to delineate the genetic structure of populations of wild pink salmon inhabiting PWS. (This project was formerly numbered 95320D.)

Chief Scientist's Recommendation: This is the second year of this work on the genetic stock structure of pink salmon in Prince William Sound. This is a good proposal being conducted by well-qualified geneticists. The proposed breeding experiments are justified in order to interpret the heterozygosity of certain genes used as markers.

Trustee Council Action: Fund close-out of current work. Defer new data gathering pending further review of all pink salmon proposals addressing genetics/straying/stock idenfitication questions. This project is designed to determine geographic extent of genetic differences in PWS pink salmon. In combination with 96093A and B, this information will guide development of management strategies for single vs. multiple stocks.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96210

Project Title: Prince William Sound Youth Area Watch

Proposer:	Chugach Regional Resources Corporation	**New or Cont'd:**	NEW
		Cluster:	Subsistence Projects
RPL Request:	ADFG $115.0		
		Cooperating Federal Agencies:	None
Total FY 96:	$115.0		

Project Summary: Students from Chenega Bay, Tatitlek and some outlying areas will participate in research projects identified by the Prince William Sound Science Center and other EVOS researchers. The objective is to increase the awareness of youth regarding the effects of the oil spill and encourage their involvement in research/restoration. Students will be involved in oceanographic testing, fish monitoring, bird and mammal observations, pristane/mussel analysis and octopus studies.

Chief Scientist's Recommendation: A solid proposal for a pilot project to involve local youth in the scientific aspects of the restoration program. Well presented and integrated proposal.

Trustee Council Action: Fund as a pilot project. However, no funds should be spent on this project until legal and budget review are complete, liability concerns are resolved, and final approval is received from the Executive Director.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96214

Project Title: Documentary on Subsistence Harbor Seal Hunting in PWS

Proposer:	Tatitlek Village	**New or Cont'd:**	NEW
		Cluster:	Subsistence Projects
RPL Request:	ADFG $77.4		
		Cooperating Federal Agencies:	
Total FY 96:	$77.4		None

Project Summary: The purpose of this project is to make a documentary on subsistence hunting of harbor seals in PWS. This video will document all facets of harbor seal hunting including the ecological and biological knowledge hunters use to hunt harbor seals. By documenting this knowledge, the project will enhance the restoration of the seal population by providing an indigenous hunter's perspective on harbor seal ecology.

Chief Scientist's Recommendation: Project is an excellent idea. Will directly serve the interests of the communities, and will assist restoration of harbor seals by allowing subsistence users to make better decisions about the resource.

Trustee Council Action: Fund.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96225

Project Title: Port Graham Pink Salmon Subsistence Project

Proposer:	Port Graham	**New or Cont'd:**	NEW
		Cluster:	Subsistence Projects
RPL Request:	ADFG $95.3		
		Cooperating Federal Agencies:	
Total FY 96:	$95.3		None

Project Summary: This project will help supply pink salmon for subsistence use in the Port Graham area during the broodstock development phase of the Port Graham hatchery. Because local runs of coho and sockeye salmon, which are the more traditional salmon subsistence resources, are at low levels, pink salmon are now heavily relied on for subsistence This project will help ensure that pink salmon remain available for subsistence use until the more traditional species are rejuvenated.

Chief Scientist's Recommendation: Potentially worthwhile project that should supplement pink salmon production for the benefit of subsistence users.

Trustee Council Action: Fund. Project is intended to increase the availability of pink salmon for subsistence use, replacing runs of coho and sockeye salmon depleted since the oil spill.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96244

Project Title: Community-Based Harbor Seal Management and Biological Sampling

Proposer: Alaska Native Harbor Seal Commission

New or Cont'd: Continued

Cluster: Subsistence Projects

RPL Request: ADFG $128.5

Total FY 96: $128.5

Cooperating Federal Agencies: None

Project Summary: The goal of the project is to facilitate the involvement of subsistence users of harbor seals in the restoration of this species through two workshops, conducting biological sampling, collection and application of traditional knowledge, and development of a traditional knowledge database. A subcontract with the Alaska Native Harbor Seal Commission will contribute to developing a meaningful role for subsistence hunters in research and restoration activities.

Chief Scientist's Recommendation: This is a well integrated and technically feasible project.

Trustee Council Action: Fund. This project will follow through on recommendations from workshops supported through previous Trustee Council projects. Subsistence users will be involved in harbor seal restoration through collecting biological samples from subsistence-taken animals, and a traditional knowledge database will be developed and distributed.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96255

Project Title: Kenai River Sockeye Salmon Restoration

Proposer:	ADFG		**New or Cont'd:**	Continued
			Cluster:	Sockeye Salmon Program
RPL Request:	ADFG	$239.8		
Total FY 96:	$442.9		**Cooperating Federal Agencies:**	None

Project Summary: Greatly reduced fishing time in upper Cook Inlet in 1989 due to the presence of oil caused sockeye salmon spawning escapements in the Kenai River to exceed the desired amount by three times. The overescapement may have reduced survival of juvenile sockeye salmon. Careful monitoring and possible reduction of Kenai River sockeye salmon harvests may be necessary to ensure adequate escapements. The goal of this project is to restore Kenai River sockeye salmon through improved stock assessment capabilities and more accurate regulation of spawning levels.

Chief Scientist's Recommendation: This has been an excellent program, producing landmark results in '94 and '95. It has achieved its objectives by providing management tools for the upper Cook Inlet fishery. Closeout funds are requested for '96, but the amount seems high.

Trustee Council Action: Fund close-out of FY 95 project. Defer a decision on FY 96 and future years until December, pending a review of the 1995 Kenai/Skilak sockeye return and of the overall Kenai/Skilak sockeye program. The project provides in-season identification of actual runs that Cook Inlet fishermen are harvesting which is used by fisheries managers to modify fishing areas and openings to protect Kenai/Skilak stocks.

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Project Number: 96258A

Project Title: Sockeye Salmon Overescapement Project

Proposer:	ADFG		**New or Cont'd:**	Continued
			Cluster:	Sockeye Salmon Program
RPL Request:	ADFG	$460.2		
			Cooperating Federal Agencies:	
Total FY 96:	$858.9			None

Project Summary: This proposal provides for a close-out budget for the Kenai lakes sockeye research program with a limited continued sockeye monitoring program for the Kodiak Island lakes. If depressed adult returns from 1989 brood are observed in the Kenai River in 1995, continuation of the evaluation is proposed for the 1996 field season, which would bring the FY 96 cost to $907,800. In addition, a separate proposal to experimentally evaluate the proposed mechanism leading to reduced production of smolt from the Kenai systems by mean of an *in situ* enclosure study is integrated into these investigations.

Chief Scientist's Recommendation: Preliminary analysis of the 1995 return appears to confirm a weak return of the 1990 brood year, which would be consistent with an effect of overescapement in 1987 - 1989. The fry weight data and observations on vertical migration of zooplankton migh. also reflect on effect of overescapement. The application of the limnological work to management is unclear. The closeout costs appear high and further description of the analysis to be conductd on 1995 data is needed. I cannot recommend gathering new data except perhaps in Red and Akalura lakes on Kodiak Island.

Trustee Council Action: Fund close-out of FY 95 work on Kenai/Skilak portion; continue limited Kodiak monitoring. Defer decision on FY 96 and future years' Kenai/Skilak work until fall, pending review of 1995 sockeye return and of the overall Kenai/Skilak sockeye program. This project investigates multiple mechanisms for injuries to sockeye caused by overescapement, and also will determine the effects on smolt escapement and ultimate production of returning adults. It also monitors recovery of Kodiak runs and provides information to help restore these runs.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96259

Project Title: Restoration of Coghill Lake Sockeye Salmon

Proposer:	ADFG		**New or Cont'd:**	Continued
			Cluster:	Sockeye Salmon Program
RPL Request:	ADFG	$71.0		
Total FY 96:	$285.8		**Cooperating Federal Agencies:**	USFS

Project Summary: Coghill Lake has historically been a major sockeye producer for PWS. The current production is very low and could jeopardize the sustainability of this sockeye stock without restoration efforts. This project continues a program begun in 1993 to fertilize Coghill Lake to restore the run. A restored sockeye salmon run would provide an important replacement resource for sport and commercial fisheries in PWS.

Chief Scientist's Recommendation: This project is a replacement action for oil spill injury using lake fertilization to increase sockeye salmon production in Coghill Lake. Reviews have identified risks in the approach taken. If the fertilization program does not work, we are not likely to know why. In spite of my reservations about the project, I recommend continued funding.

Trustee Council Action: Defer pending review of FY 95 results (fund interim). Consistent with recommendation in FY 95 work plan, there must be a transition to a non-Trustee funding source after FY 97. This project is designed to restore Coghill Lake to its former position as a mainstay of the commercial/sport sockeye fishery in PWS. Although the injury to this fishery was not caused by the oil spill, this project has been conducted on a replacement basis for losses of other fishery resources.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
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Project Number: 96272

Project Title: Chenega Chinook Release Program

Proposer:	Prince William Sound Aquaculture Corporation	**New or Cont'd:**	Continued
		Cluster:	Subsistence Projects
RPL Request:	ADFG $52.3		
		Cooperating Federal Agencies:	
Total FY 96:	$52.3		None

Project Summary: Chinook salmon incubated and reared at the Wally Noerenberg Hatchery will be released in Crab Bay, adjacent to the native community of Chenega. Adult salmon returning to the site of release will provide replacement resources and associated services injured by the oil spill. Two releases have taken place (1994 & 1995) as part of this multi-year project. Adult salmon will begin returning in 1996 and 1997, with larger numbers projected at nearly 1,000 adult fish returning in 1998 and thereafter.

Chief Scientist's Recommendation: Excellent proposal. Good match with Trustee Council's fish supplementation criteria. Good local involvement. Suggest continued Trustee Council funding through at least FY 97, pending project review in Fall 1996 to assess effectiveness.

Trustee Council Action: Fund through one full chinook salmon life cycle (at least FY 97). Review effectiveness in fall of 1996. Project will provide replacement resources for subsistence salmon injured by the oil spill. However, the proposers should develop a plan for a transition to non-Trustee funding.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320E

Project Title: SEA: Salmon and Herring Predation

Proposer:	ADFG		**New or Cont'd:**	Continued
			Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG	$637.7		
			Cooperating Federal Agencies:	None
Total FY 96:	$637.7			

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This sub-project would determine the extent to which variations in predation on juvenile pink salmon affect survival and describe mechanisms that cause variation in predation. This would include the identification of fish predators (distribution, abundance, species, and size composition) along the juvenile salmon migratory pathway. The project will also collect samples for a variety of the other SEA efforts.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320G

Project Title: SEA: Phytoplankton and Nutrients

Proposer:	McRoy, University of Alaska/Fairbanks	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $162.2		
		Cooperating Federal Agencies:	None
Total FY 96:	$162.2		

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This project would focus on primary production and provide nutrient and phytoplankton data to help evaluate the influence of phytoplankton dynamics on the PWS food web. The project would examine variations in phytoplankton production in relation to zooplankton production and oceanographic conditions.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320H

Project Title: SEA: Zooplankton in the PWS Ecosystem

Proposer:	Cooney, University of Alaska/Fairbanks	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $323.6		
		Cooperating Federal Agencies:	
Total FY 96:	$323.6		None

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This project would continue to investigate the annual zooplankton bloom and its relationship to fish predator abundance. The project would sample and monitor the distribution and composition of PWS macrozooplankton populations in collaboration with the physical oceanography component of SEA.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320I

Project Title: SEA: Isotope Tracers - Food Webs of Fish

Proposer:	Prince William Sound Science Center	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $83.3		
		Cooperating Federal Agencies:	NOAA
Total FY 96:	$195.8		

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This sub-project would analyze tissue samples and use shifts in stable isotope ratios that occur with trophic level and food source to describe food sources and predation relationships among species in PWS.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94. Future program effort and funding will be considered after mid-January SEA program review session. Projected SEA cost in FY 97 is $3,600.0; FY 98 is $2,600.0.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320J

Project Title: SEA: Information Systems and Model Development

Proposer:	Prince William Sound Science Center	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $180.5		
Total FY 96:	$482.7	**Cooperating Federal Agencies:**	DOI, NOAA

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This particular sub-project would provide an information system appropriate for the SEA effort and develop the modeling resources needed to achieve the program's objectives. This sub-project provides for overall data management and technical support to other SEA efforts through field data communications; descriptive modeling; numerical modeling; support with sampling technologies; and on-line analysis and visualization tools. This sub-project provides the means by which various data can be collected, used and understood.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94. Future program effort and funding will be considered after mid-January SEA program review session. Projected SEA cost in FY 97 is $3,600.0; FY 98 is $2,600.0.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320K

Project Title: SEA: PWSAC -- Experimental Fry Release

Proposer:	Prince William Sound Aquaculture Corporation	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $61.4		
		Cooperating Federal Agencies:	NOAA
Total FY 96:	$61.4		

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This project would support the rearing of salmon fry for release as part of an effort to investigate the possible influence of fry size as a determinant of survival during early marine residence as part of the SEA study effort.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320M

Project Title: SEA: Physical Oceanography in PWS

Proposer:	Prince William Sound Science Center	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $191.7		
		Cooperating Federal Agencies:	
Total FY 96:	$499.4		NOAA

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This project would investigate the physical oceanographic structure of PWS including the space/time variability of atmospheric and oceanic processes within PWS, investigate relationships between atmospheric forcing (wind, storms, long term temperature changes) and wind and buoyancy-driven currents; determine how these relationships act to retain/disperse food resources for ecologically important species within PWS; and investigate large and fine scale oceanographic structures and major climatic cycles and events.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94. Future program effort and funding will be considered after mid-January SEA program review session. Projected SEA cost in FY 97 is $3,600.0; FY 98 is $2,600.0.

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EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320N

Project Title: SEA: Nekton/Plankton Acoustics

Proposer:	Prince William Sound Science Center	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $209.9		
		Cooperating Federal Agencies:	NOAA
Total FY 96:	$487.6		

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This project would describe macrozooplankton distribution and biomass in real time using hydroacoustics; describe fish predator distribution/biomass in real time using hydroacoustics; investigate hypothesis that plankton/nekton/predator populations aggregate in cyclic patterns and specific locations due to currents and bottom morphology.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94. Future program effort and funding will be considered after mid-January SEA program review session. Projected SEA cost in FY 97 is $3,600.0; FY 98 is $2,600.0.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320R

Project Title: SEA: Trophodynamic Modeling and Validation Through Remote Sensing

Proposer:	Eslinger, University of Alaska/Fairbanks	**New or Cont'd:**	NEW
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $202.7		
Total FY 96:	$202.7	**Cooperating Federal Agencies:**	None

Project Summary: This is a new SEA sub-project in FY 96 as a result of an internal reorganization of efforts. Some of the work performed under 95320-G and J is to be done under this project in FY 96 and beyond. This project would continue the trophodynamic modeling of phytoplankton and zooplankton begun in FY 95 and add modeling of ichthyoplankton, herring larvae in particular. It will evaluate and verify the model against field data to be collected using a variety of remote sensing and *in situ* sampling platforms.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work. This reorganization of the SEA program seems logical and effective. This work is central to development of an understanding of controls of year-to-year variation in recruitment success of fish in Prince William Sound.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320T

Project Title: SEA: Juvenile Herring Growth and Habitat Partitioning

Proposer:	Norcross, University of Alaska/Fairbanks	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $1,141.6		
		Cooperating Federal Agencies:	None
Total FY	$1,141.6		

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This sub-project would investigate what may be causing the failure of herring runs in PWS by investigating the dynamics of larval and juvenile herring. The proposed project, together with other investigations being undertaken as part of the SEA program, would attempt to describe the relative importance of zooplankton abundance, oceanic conditions, habitat requirements, and density dependent predation in determining large fluctuations in herring abundance. The budget for this sub-project contains research vessel charter costs that will support SEA project efforts.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320U

Project Title: SEA: Energetics of Herring and Pollock

Proposer:	Paul, University of Alaska/Fairbanks	**New or Cont'd:**	Continued
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $189.5		
		Cooperating Federal Agencies:	None
Total FY 96:	$189.5		

Project Summary: This project would continue work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). Project would focus on the seasonal somatic energy cycles of two important forage fish species in the spill area: Pacific herring and walleye pollock. The project would explore overwinter survival of juvenile herring and herring reproductive biology and provide energetic information to quantify trophic interactions (food webs) involving pollock.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320Y

Project Title: SEA: Variation in Local Predation Rates on Hatchery-Released Fry

Proposer: Prince William Sound Science Center

New or Cont'd: Continued

Cluster: Sound Ecosystem Assessment (SEA)

RPL Request: ADFG $40.0

Total FY 96: $40.0

Cooperating Federal Agencies: None

Project Summary: Project close out of investigation of the size, composition, behavior and duration of foraging aggregations of predators, especially birds, at fry release sites.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94. Funding provides for closeout (analysis and final report writing) of prior year work. Future program effort and funding will be considered after mid-January SEA program review session.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96320Z1

Project Title: SEA: Synthesis and Integration

Proposer:	Cooney, University of Alaska/Fairbanks	**New or Cont'd:**	NEW
		Cluster:	Sound Ecosystem Assessment (SEA)
RPL Request:	ADFG $68.8		
		Cooperating Federal Agencies:	None
Total FY 96:	$68.8		

Project Summary: This project would support work initiated in FY 94 as part of the Sound Ecosystem Assessment (SEA) program effort (Project 96320). This sub-project provides additional support to the Lead Scientist of the Project for synthesis and integration activities associated with the application of SEA field and modelling studies to the restoration of pink salmon and Pacific herring populations in PWS.

Chief Scientist's Recommendation: Project helps provide the larger context of ecosystem structure under which restoration must be considered to be effective, and is likely to contribute valuable information for the management of salmon and herring in PWS. A review workshop should be held in January 1996, at which we would expect a substantial review of the first 2 years' work. Necessary for effective project management, although cost for administrative support seems high.

Trustee Council Action: Fund. Part of the 14-part $4,525.7 Sound Ecosystem Assessment (SEA) Project 96320 initiated in FY 94.

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96427

Project Title: Harlequin Duck Recovery Monitoring

Proposer:	ADFG		**New or Cont'd:**	Continued
			Cluster:	Nearshore Ecosystem Projects
RPL Request:	ADFG	$51.0		
Total FY 96:	$261.1		**Cooperating Federal Agencies:**	None

Project Summary: This project will compare population parameters between oiled and unoiled areas based on population structure, behavior, production, and growth rates. Shoreline boat surveys will be conducted simultaneously. Changes in population size, structure, and production in oiled and unoiled areas and between years will be compared. Continued population monitoring and brood surveys will allow us to assess trends and suggest factors limiting recovery.

Chief Scientist's Recommendation: Surveys of harlequin ducks are a high restoration priority. However, without statistical justification, a decision on work for 1997 and beyond should be made later. Three more years of effort are proposed for this project. This request for future work should be examined after review of FY 96 work.

Trustee Council Action: Fund interim costs; defer decision on balance of FY 96 funding until report from prior year (Project B11) is submitted. Consider funding for future years after review of FY 96 work. This project continues a series of studies focusing on injury to and recovery of harlequin ducks in PWS. This information will help determine when current harvest restrictions can be lifted and whether additional actions, such as more cleanup of oiled mussel beds, are necessary.

9/11/95

EXXON VALDEZ OIL SPILL — FY 96 WORK PLAN
Revised Program 11 - 6 - 9990

Project Number: 96600

Project Title: Program Management

Proposer:	NOAA		**New or Cont'd:**	Continued
			Cluster:	Seabird/Forage Fish Ecosystem Project
RPL Request:	ADFG	$53.5		
Total FY 96:	$53.5		**Cooperating Federal Agencies:**	NOAA

Project Summary: The purpose of this project is provide support for continued NOAA participation in *Exxon Valdez* damage assessment and management. The program manager of the Office of Oil Damage Assessment and Restoration is responsible for management and oversight of scientists and contractors as they relate to the *Exxon Valdez* Oil Spill Trustee Council. The program manager has responsibility for maintaining information and records on studies schedules, work progress and study products and works closely with project leaders of studies to ensure that program goals. objectives and timelines are met.

Chief Scientist's Recommendation: Not applicable.

Trustee Council Action: Fund.

9/11/95

Exxon Valdez Oil Spill Trustee Council

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

MEMORANDUM

TO: Nancy Slagle
Director
Division of Budget Review
Office of Management and Budget

FROM: Molly McCammon
Executive Director

DATE: December 20, 1995

RE: *Exxon Valdez* Oil Spill Revised Program 11-6-9992

In accordance with Chapter 1, FSSLA 1992, the Departments of Fish and Game, Environmental Conservation, and Natural Resources request authority to receive and expend $2,231,100 from *Exxon Valdez* oil spill settlement trust funds.

This represents the second request for authority to receive and expend settlement trust funds for the Federal Fiscal Year 1996 Work Plan. The first request, RPL 11-6-9990 was approved by the committee at the September 28, 1995 meeting. This revised program requests additional authority and incorporates all Trustee Council action to date.

The 1996 Work Plan was developed based on extensive scientific, budget and policy review, taking into consideration comments received from the public and the Trustee Council's 17-member Public Advisory Group. The following discussion is an overview of the process used for development of the 1996 Work Plan. In addition, attached is a flow-chart which depicts the process.

In November 1994, the Trustee Council adopted the *Exxon Valdez* Oil Spill Restoration Plan. The plan provides for a comprehensive, balanced approach to achieve the recovery objectives for the biological resources and human services injured by the oil spill. To be eligible for funding, proposals must be consistent with the policies in the Restoration Plan.

At the 1995 Restoration Workshop held January 17-20, 1995 in Anchorage, over 120 participants, including individuals currently conducting restoration projects, scientists

familiar with the spill, and members of the public reviewed previous years' work and analyzed restoration needs for the future. The Trustee Council staff used discussions at the workshop to produce the March 1995 Invitation to Submit Restoration Projects for Federal Fiscal Year 1996 and Draft Restoration Program: FY96 and Beyond (Invitation). The Invitation called for proposals to be submitted by May 1, 1995.

Public involvement and comment was also solicited during this period. A series of public meetings were held throughout the spill area during the month of April. The focus of the meetings was to discuss concerns of the public relevant to the continuing effects of the oil spill, communicate findings of previous years' work, discuss the Draft FY96 Restoration Program, and answer questions about the 1996 Invitation.

After proposals were received, they were reviewed by the Chief Scientist and peer reviewers, who are under contract to provide the Trustee Council an independent scientific and technical review of project proposals. Concurrently with the scientific review, all proposals were reviewed by the staff of the Trustee Council. This included individuals from the Restoration Office, representatives of each Trustee agency, and legal counsel from both the federal and state governments.

Based on the reviews, the preliminary recommendation of the Executive Director was published in the Draft Fiscal Year 1996 Work Plan in late June, with public comments due August 4, 1995. In addition, a public hearing on the Draft Work Plan was held on July 20, 1995 in Anchorage. Teleconference access was available to spill area communities and other interested communities.

The Public Advisory Group met in early August to review the Executive Director's preliminary recommendations and provide additional public comment. The Executive Director developed the final recommendations for consideration by the Trustee Council, taking into consideration comments received from the public and the Public Advisory Group.

Based on the Executive Director's recommendations and public comments, the Trustee Council took action on the first part of the FY 1996 Work Plan on August 25, 1995. RPL 11-6-9990 was then submitted to the Legislative Budget and Audit Committee for approval on September 28, 1995.

As noted at the September Legislative and Budget Audit Committee meeting, the Trustee Council did not act on the entire Work Plan in August. For some projects, the Council deferred action pending further review. For the most part, this review involved analysis of the results from the 1995 field session. Based on a series of these reviews, the Trustee Council met December 11, 1995 and took action on the balance of the 1996 Work Plan.

The attached table reflects the individual projects proposed for implementation by the

state agencies. Committee action is being sought on twenty projects. Of that total, additional authorization is being proposed on fourteen projects previously approved, one project has been reduced, one project has been eliminated, and four new projects are being proposed. An abstract for each project has been attached to this request. The abstract summarizes the project, the Chief Scientist's recommendation on the project and the Trustee Council action. Detailed information exists for each project. If you would like additional information on any of the projects or any other aspect of the restoration program, please let me know.

Since the Trustee Council operates on the Federal Fiscal Year, authority to receive and expend is being requested through state fiscal year 1997 for these projects. Authorization to receive and expend is being requested in the amount of $2,231,100 allocated to agencies as follows:

Environmental Conservation	$50,200
Fish and Game	$1,846,600
Natural Resources	$334,300

Thank you for consideration of this request. If you have any questions, give me a call at 278-8012.

attachments

cc: Joe Sullivan, ADF&G
Ernie Piper, ADEC
Carol Fries, ADNR

Exxon Valdez Oil Spill Trustee Council

Development of the FY 96 Restoration Work Plan

January 1995
Annual Restoration Workshop

Review of restoration program to date by independent scientists, researchers, resource managers, community representatives, PAG members, Chief Scientist, and Restoration Office staff.

Key issues discussed:

- What is the status of injured resources?
- Are restoration objectives still appropriate?
- What did we accomplish in 1994?
- What should be done in the future ?

Basis for *FY96 Invitation and Draft Restoration Program: FY 96 & Beyond*

March 1995
Invitation for FY 96 Project Proposals

Invitation for FY 96 & Draft Restoration Program: FY 96 and Beyond

- Review and summary of key findings and accomplishments
- Continued focus on key restoration issues
- Projection of anticipated restoration work plan FY 1996 – 1998
- Increased use of competitive mechanisms (Broad Agency Announcement)
- Project proposals submitted by May 1, 1995

May – August 1995
FY 96 Project Evaluation and Council Action

- 128 proposals submitted totalling approximately $38.8 million
- Chief Scientist/peer review process
- PAG review
- *Draft FY 96 Work Plan* published in late June
- Public comment solicited
- Legal and budget review
- Executive Director recommendation developed
- Trustee Council authorizes majority of FY 1996 projects
- RPL 11-6-9990 submitted and approved by Legislative Budget and Audit

August — Dec 1995
Review Sessions on Deferred Projects and Council Action

- Deferred projects subject to further technical review
- Technical peer reviews:
  - octopus
  - clams
  - harlequin duck
  - shoreline oiling
  - Pacific herring
  - sockeye salmon
  - seabird/forage fish
  - pink salmon/genetics
- PAG review and Executive Director recommendation developed
- Trustee Council authorizes remainder of 1996 projects
- RPL 11-6-9992 submitted to Legislative Budget and Audit

DRAFT 12/20/95

EXXON VALDEZ TRUSTEE COUNCIL
1996 Federal Fiscal Year Project Budget
October 1, 1995 - September 30, 1996

Agency	Project Number	Project Title	RPL 11-6-9990	RPL 11-6-9992	STATE FUNDS TOTAL
ADEC	96027	Kodiak Archipelago Shoreline Assessment	$10.0	$15.2	$25.2
	96100	Administration, Public Information and Scientific Management	$204.3		$204.3
	96115	Sound Waste Management Plan	$28.3		$28.3
	96507	EVOS Symposium Publication		$35.0	$35.0
		ADEC Total	**$242.6**	**$50.2**	**$292.8**
ADF&G	96001	Recovery of Harbor Seals: Condition and Health Status	$214.1		$214.1
	96025	Mechanism of Impact and Potential Recovery of Nearshore Vertebrate Predators	$542.4		$542.4
	96052	Community Involvement and Use of Traditional Knowledge	$261.0	$10.0	$271.0
	96064	Monitoring, Habitat Use and Trophic Interactions of Harbor Seals in PWS	$347.3		$347.3
	96086	Herring Bay Monitoring and Restoration Studies	$173.0		$173.0
	96100	Administration, Public Information and Scientific Management	$1,956.4		$1,956.4
	96106	Subtidal Monitoring: Eelgrass Communities	$250.0	$(22.8)	$227.2
	96126	Habitat Protection Acquisition Support	$20.0		$20.0
	96127	Tatitlek Coho Salmon Release	$26.6		$26.6
	96131	Chugach Native Region Clam Restoration		$274.9	$274.9
	96139A1	Salmon Instream Habitat and Stock Restoration - Little Waterfall Barrier Bypass	$55.0		$55.0
	96139A2	Spawning Channel Construction Project - Port Dick, Lower Cook Inlet	$230.5		$230.5
	96162	Investigations of Disease Factors Affecting Declines of Pacific Herring Populations in PWS	$204.1	$430.9	$635.0
	96163C	Fish Diet Overlap Using Fish Stomach Content Analysis	$21.5	$34.2	$55.7
	96163L	Historical Review of Ecosystem Structure in the PWS/GOA Complex and Abundance and Distribution of Forage Fish in the Barren Islands	$4.8	$27.5	$32.3

EXXON VALDEZ TRUSTEE COUNCIL
1996 Federal Fiscal Year Project Budget
October 1, 1995 - September 30, 1996

Agency	Project Number	Project Title	RPL 11-6-9990	RPL 11-6-9992	STATE FUNDS TOTAL
	96164	Pacific Herring Program Leadership	$49.2	$(49.2)	$0.0
	96165	Genetic Discrimination of Prince William Sound Herring Populations	$103.9		$103.9
	96166	Herring Natal Habitats	$229.9	$214.2	$444.1
	96170	Isotope Ratio Studies of Marine Mammals	$150.4		$150.4
	96180	Kenai Habitat Restoration and Recreation Enhancement Project	$281.0		$281.0
	96186	Coded Wire Tag Recoveries From Pink Salmon in Prince William Sound	$254.9		$254.9
	96188	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in PWS	$93.2		$93.2
	96190	Construction of Linkage Map for Pink Salmon Genome		$167.7	$167.7
	96191A	Oil-Related Embryo Mortalities in PWS Pink Salmon Populations	$389.5	$85.1	$474.6
	96196	Genetic Structure of Prince William Sound Pink Salmon	$71.3	$107.2	$178.5
	96210	Prince William Sound Youth Area Watch	$115.0		$115.0
	96214	Documentary on Subsistence Harbor Seal Hunting in PWS	$77.4		$77.4
	96225	Port Graham Pink Salmon Subsistence Project	$95.3		$95.3
	96244	Community Based Harbor Seal Management and Biological Sampling	$128.5		$128.5
	96255	Kenai River Sockeye Salmon Restoration	$239.8	$67.2	$307.0
	96256	Columbia and Solf Lakes Sockeye Salmon Stocking		$17.4	$17.4
	96258A	Sockeye Salmon Overescapement Project	$460.2	$136.4	$596.6
	96259	Restoration of Coghill Lake Sockeye Salmon	$71.0	$83.9	$154.9
	96272	Chenega Chinook Release Program	$52.3		$52.3
	96320E	Salmon and Herring Predation	$637.7		$637.7
	96320G	Phytoplankton and Nutrients	$162.2		$162.2
	96320H	Zooplankton in the PWS Ecosystem	$323.6		$323.6
	96320I	Isotope Tracers - Food Webs of Fish	$83.3		$83.3
	96320J	Information Systems and Model Development	$180.5		$180.5
	96320K	PWSAC: Experimental Fry Release	$61.4		$61.4

EXXON VALDEZ TRUSTEE COUNCIL
1996 Federal Fiscal Year Project Budget
October 1, 1995 - September 30, 1996

Agency	Project Number	Project Title	RPL 11-6-9990	RPL 11-6-9992	STATE FUNDS TOTAL
	96320M	Physical Oceanography in PWS	$191.7		$191.7
	96320N	Nekton/Plankton Acoustics	$209.9		$209.9
	96320R	SEA Trophodynamic Modeling and Validation Through Remote Sensing	$202.7		$202.7
	96320T	Juvenile Herring Growth and Habitat Partitioning	$1,141.6		$1,141.6
	96320U	Energetics of Herring and Pollock	$189.5		$189.5
	96320Y	Variation in Local Predation Rates on Hatchery-Released Fry	$40.0		$40.0
	96320Z1	Synthesis and Integration	$68.8		$68.8
	96427	Harlequin Duck Recovery Monitoring	$51.0	$210.1	$261.1
	96600	Program Management	$53.5	$51.9	$105.4
		ADF&G Total	**$10,766.9**	**$1,846.6**	**$12,613.5**
ADNR	96007A	Archaeological Index Site Monitoring	$96.4		$96.4
	96100	Administration, Public Information and Scientific Management	$847.5		$847.5
	96126	Habitat Protection Acquisition Support	$394.6	$334.3	$728.9
	96149	Archaeological Site Stewardship	$54.1		$54.1
	96154	Comprehensive Community Planning for Restoration of Archaeological Resources in PWS and Lower Cook Inlet	$9.6		$9.6
	96180	Kenai Habitat Restoration and Recreation Enhancement Project	$241.9		$241.9
		ADNR Total	**$1,644.1**	**$334.3**	**$1,978.4**
		TOTAL	**$12,653.6**	**$2,231.1**	**$14,884.7**

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96027			
Project Title:	Kodiak Archipelago Shoreline Assessment: Monitoring Surface and Subsurface Oil			
Proposer:	ADEC			
RPL Request:	ADEC	S15.2	Cluster:	Nearshore Ecosystem Projects
Total FY 96:	$39.8		Cooperating Federal Agencies:	NOAA

Project Summary:

Continued funding for ongoing project. This project completes work begun in FY 95 to determine the areal extent, toxicity and origin of oil on selected Kodiak Archipelago shorelines. Most of these shorelines were last surveyed in 1990. The information about the remaining oil is necessary to determine whether recovery is proceeding at an acceptable rate, and to help local people assess whether the presence of remaining oil is still affecting shoreline activities. It also provides funding to develop information about future shoreline treatment in Prince William Sound.

Chief Scientist's Recommendation:

Close-out funding will allow community meetings to be held and final report to be written.

Trustee Council Action:

Fund. Project is closeout of FY 95 shoreline assessment work in Kodiak. Project also will develop and assess information about future monitoring needs and alternative shoreline treatments.

EXXON VALDEZ OIL SPILL -- FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96052		
Project Title:	Community Involvement & Use of Traditional Knowledge		
Proposer:	Chugach RRC		
RPL Request:	ADFG $10.0	Cluster:	Subsistence Projects
Total FY 96:	$271.0	Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. This project, submitted by the Chugach Regional Resources Commission (CRRC), will continue a program begun in FY 95. This project will encourage and facilitate communication among the Trustee Council, researchers working on oil spill restoration projects, regional organizations and residents of communities impacted by the oil spill. The project includes a pilot effort to integrate western science and Traditional Ecological Knowledge to further the restoration program.

Chief Scientist's Recommendation:

Addresses needed restoration work by furthering interactions between EVOS scientists and community members.

Trustee Council Action:

Fund. This project continues a program to facilitate communication and interaction among the Trustee Council, scientists, and residents of communities impacted by the oil spill.

EXXON VALDEZ OIL SPILL -- FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96106		
Project Title:	Subtidal Monitoring: Eelgrass Communities		
Proposer:	Jewett/UAF		
RPL Request:	ADFG S(22.8)	Cluster:	Nearshore Ecosystem Projects
Total FY 96:	$253.1	Cooperating Federal Agencies:	NOAA

Project Summary: This project would provide funds to write the final report for Project 95106. The budget reflects projected costs of sample analysis, data analysis, and report preparation. The final report will incorporate and compare all data collected since 1991. This reduction in authorization reflects a transfer of funds from ADFG to NOAA based on new cost estimates of sample analysis.

Chief Scientist's Recommendation: This is a close-out project for work previously funded by the Trustees. The investigator is doing a very good job on subtidal studies.

Trustee Council Action: Fund. This project closes out work funded in previous years.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96126		
Project Title:	Habitat Protection and Acquisition Support		
Proposer:	ADFG, ADNR		
RPL Request:	ADNR $334.3	Cluster:	Habitat Protection Support
Total FY 96:	$2,160.9	Cooperating Federal Agencies:	USFS, DOI

Project Summary:

Continued funding for ongoing project. This project supports activities necessary for the Trustee Council's habitat protection program, including negotiations with willing private landowners, parcel appraisals, hazardous materials surveys, title searches, and site visits as needed. Authority to receive and expend at this time is limited to acquisition support and management costs. Separate requests will be submitted for review once agreements involving the state are completed.

Chief Scientist's Recommendation:

The Chief Scientist's recommendation in support of habitat protection was documented as part of the *Report of the Executive Director Concerning Habitat Acquisition* (November 28, 1994).

Trustee Council Action:

Fund.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96131		
Project Title:	Chugach Native Region Clam Restoration		
Proposer:	Chugach RRC		
RPL Request:	ADFG $274.9	Cluster:	Subsistence Projects
Total FY 96:	$274.9	Cooperating Federal Agencies:	None

Project Summary:

Resident clam populations near the Native villages of Port Graham, Nanwalek, and Tatitlek will be re-established to restore diminished subsistence opportunities. The Qutekcak hatchery in Seward will annually provide about 800,000 juvenile littleneck clams, cockles and, if possible, butter clams for seeding. Historical information, local and agency expertise, and research will be used to identify areas to seed and methods used. Total seeded area will not exceed 5 hectares. In addition, beaches will be surveyed in Chenega and Ouzinkie for possible future seeding. Also, Eyak razor clams will be identified and work will be initiated to protect the existing clam populations from natural predators.

Chief Scientist's Recommendation:

This project was successful in spawning little-neck clams and raising their spat, and it has the potential of making an important contribution to restoration of subsistence use of clams. However, there is need for continued development of hatchery techniques, which will require consultation with experts who have appropriate experience. I recommend continued support of this project, emphasizing development of hatchery techniques that eventually may be applied on a larger scale.

Trustee Council Action:

Fund continuing pilot effort in Port Graham, Nanwalek, and Tatitlek. Fund initial beach surveys in Chenega and Ouzinkie, and analysis of clam predator problem in Cordova (Native Village of Eyak). Funding is contingent on approval of Detailed Project Description, which must address hatchery issues raised by peer reviewers. Project is intended to establish subsistence clam populations as replacement for subsistence resources injured by the oil spill.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96162		
Project Title:	Investigations of Disease Factors Affecting Declines of Pacific Herring Populations in Prince William Sound, AK		
Proposer:	UW/UCD/SFU		
RPL Request:	ADFG $430.9	Cluster:	Herring Projects
Total FY 96:	$635.0	Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. Field and laboratory studies will focus on Viral Hemorrhagic Septicemia (VHS) and *Ichthyophonus hoferi*, a pathogenic fungus, to determine their role in the disease and mortality observed in PWS herring since 1993. Herring in PWS will be monitored three times per year for signs of disease and immune status. Specific pathogen-free herring will be used to determine the degree of mortality, blood chemical changes and pathogenicity produced by these organisms alone and in combination with exposure to stressors such as petroleum hydrocarbons, temperature and crowding. (This project was formerly numbered 95320S.)

Chief Scientist's Recommendation:

Substantial progress has been made in understanding the role of VHS and *Icthyphonus* in the recent decline of Pacific herring stocks in Prince William Sound. The hypothesis that oil-induced stress is linked to the disease outbreak and population decline remains viable. The project is on track for achieving its objectives, and I recommend continued funding.

Trustee Council Action:

Fund. Project is designed to investigate potential link between oil exposure and disease, and between disease and the herring population decline in PWS. Understanding the causes of the decline and the lack of recovery is important for restoration and resumption of the herring fishery.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96163C			
Project Title:	Fish Diet Overlap Using Fish Stomach Content Analysis			
Proposer:	NOAA			
RPL Request:	ADFG	$34.2	Cluster:	Seabird/Forage Fish Ecosystem Project
Total FY 96:	$76.9		Cooperating Federal Agencies:	NOAA

Project Summary:

Continued funding for ongoing ecosystem Project 96163 (Seabird-Forage Fish/APEX). This study will use seabirds as "probes" of the trophic environment of PWS and compare their reproductive and foraging biologies with similar measurements from the Barren Islands, an area with more suitable or abundant food. Measurements will be compared with hydroacoustic and net samples of fish to calibrate seabird performance with fish distribution and abundance. The project will use fish samples to compare diet, energetics and reproductive parameters of different forage-fish species to determine whether competitive and predatory interactions or different responses to the environment may be favoring the abundance of one fish species over another.

Chief Scientist's Recommendation:

This project was undertaken as a pilot in FY95, remarkable progress was achieved in demonstrating the link between seabird productivity and forage fish populations in the spill area. The intercolony comparisons have provided qualitative evidence of food limitation of seabird colonies, which is essential to successful testing of the APEX hypotheses. However there are substantial challenges ahead in documenting these relationships on a quantitative basis. In the future, the emphasis of the work should shift from deep water to nearshore environments because most of the important interactions between seabirds and forage fish take place there. Preliminary analysis of historical trawl-catch data in the Gulf of Alaska has been extremely helpful showing how long-term and potentially large-scale changes in the composition of crustacean and fish populations might affect marine bird and mammal populations. This historical work, coupled with the current field investigations, may lead to significant improvement in the ability to understand, predict and manage the spill-area ecosystem on a sustained basis. Recommend funding this work on a full-scale basis in FY96.

Trustee Council Action:

Fund. Pilot effort in FY95 showed a link between forage fish and seabird productivity. The scientific reviewers are enthusiastic about the prospect that this work will yield results that are of benefit to the marine ecosystem in PWS and the northern Gulf of Alaska.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96163L		
Project Title:	Historical Review of Ecosystem Structure in the PWS/GOA Complex		
Proposer:	DOI		
RPL Request:	ADFG $27.5	Cluster:	Seabird/Forage Fish Ecosystem Project
Total FY 96:	$97.4	Cooperating Federal Agencies:	DOI, NOAA

Project Summary:

Continued funding for ongoing ecosystem Project 96163 (Seabird-Forage Fish/APEX). This study will use seabirds as "probes" of the trophic environment of PWS and compare their reproductive and foraging biologies with similar measurements from the Barren Islands, an area with more suitable or abundant food. Measurements will be compared with hydroacoustic and net samples of fish to calibrate seabird performance with fish distribution and abundance. The project will use fish samples to compare diet, energetics and reproductive parameters of different forage-fish species to determine whether competitive and predatory interactions or different responses to the environment may be favoring the abundance of one fish species over another.

Chief Scientist's Recommendation:

This project was undertaken as a pilot in FY95; remarkable progress was achieved in demonstrating the link between seabird productivity and forage fish populations in the spill area. The intercolony comparisons have provided qualitative evidence of food limitation of seabird colonies, which is essential to successful testing of the APEX hypotheses. However there are substantial challenges ahead in documenting these relationships on a quantitative basis. In the future, the emphasis of the work should shift from deep water to nearshore environments because most of the important interactions between seabirds and forage fish take place there. Preliminary analysis of historical trawl-catch data in the Gulf of Alaska has been extremely helpful showing how long-term and potentially large-scale changes in the composition of crustacean and fish populations might affect marine bird and mammal populations. This historical work, coupled with the current field investigations, may lead to significant improvement in the ability to understand, predict and manage the spill-area ecosystem on a sustained basis. Recommend funding this work on a full-scale basis in FY96.

Trustee Council Action:

Fund. Pilot effort in FY95 showed a link between forage fish and seabird productivity. The scientific reviewers are enthusiastic about the prospect that this work will yield results that are of benefit to the marine ecosystem in PWS and the northern Gulf of Alaska.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96164		
Project Title:	Pacific Herring Program Leadership		
Proposer:	ADFG		
RPL Request:	ADFG S(49.2)	Cluster:	Herring Projects
Total FY 96:	$0.0	Cooperating Federal Agencies:	None

Project Summary:

This project was intended to facilitate coordination, integration, and review of different aspects of Pacific herring in the PWS ecosystem. Upon further review, it was determined that the herring studies were progressing well and that these funds could be more effectively used in other aspects of the restoration program.

Chief Scientist's Recommendation:

Although I had previously recommended that ADFG needed additional leadership for its herring studies, it is evident from the recent review that ADFG's herring work is on track and that there is little prospect that the agency would be able to support increased personnel costs once Trustee support has concluded. Thus, I recommend that the funds allocated in August be withdrawn.

Trustee Council Action:

Terminate funding. With little prospect that ADFG will take over the future role expected of this project and with herring research on track under the guidance of the peer review policy, interim Trustee Council funding is not necessary.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96166			
Project Title:	Herring Natal Habitats			
Proposer:	ADFG			
RPL Request:	ADFG	$214.2	Cluster:	Herring Projects
Total FY 96:	$444.1		Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. Past studies have documented damage from oil exposure in adult herring, hatching success of embryos, and levels of physical and genetic abnormalities in larvae. The PWS herring spawning population has drastically declined since 1993, and pathology studies implicated Viral Hemorrhagic Septicemia (VHS) and *Ichthyophonus* as potential sources of mortality as well as indicators of stress. The project will continue to provide estimates of spawning herring abundance and investigate the lethality of suspected pathogens and the role of environmental contaminants in disease transmission through laboratory and field studies.

Chief Scientist's Recommendation:

This work is vital to on-going management of Pacific herring in Prince William Sound I recommend one more year of full support from the Trustees, provided that there is an explicit plan developed for transfer of this program back to ADFG as part of normal agency management.

Trustee Council Action:

Fund for FY 96 contingent upon expectation that project begins a transition to non-Trustee funding source in FY 97. Project's major objective is to improve estimate of spawning biomass of herring. This information is needed to establish harvest levels and guidelines that allow restoration to occur and to sustain a healthy fishery.

EXXON VALDEZ OIL SPILL -- FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96190		
Project Title:	Construction of a Linkage Map for the Pink Salmon Genome		
Proposer:	Allendorf/UM		
RPL Request:	ADFG S167.7	Cluster:	Pink Salmon Projects
Total FY 96:	S167.7	Cooperating Federal Agencies:	None

Project Summary:

Proposal would 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 pink salmon studies including estimation of straying rates, description of stock structure, and testing whether marine survival has a genetic basis.

Chief Scientist's Recommendation:

This project will produce a linkage map for a large number of genes in pink salmon. This project would potentially provide significant benefits for pink salmon, because it would increase knowledge of the genetic implications of management and supplementation decisions for wild and hatchery stocks. For example, a genetic linkage map would facilitate development of disease-resistant strains of fish and provide new markers for genetic stock identification. This project will require several years of support, and I encourage the proposers to seek additional sources of funds in the future. In addition, the proposer should coordinate with current efforts at the University of Alaska.

Trustee Council Action:

Fund This project provides fundamental information which will likely aid restoration of wild stocks of pink salmon and which are likely to benefit all pink salmon management in the future. It is a long-term project with national importance. Recommendation is to provide two years of funding at the requested level, but proposers should seek additional funding sources in future years.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96191A			
Project Title:	Oil-Related Embryo Mortalities in PWS Pink Salmon Populations			
Proposer:	ADFG			
RPL Request:	ADFG	$85.1	Cluster:	Pink Salmon Projects
Total FY 96:	$474.6		Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. Elevated embryo motalities were detected in populations of pink salmon inhabiting oiled streams following the oil spill. The purpose of this project is to continue to monitor the recovery of pink salmon embryos in the field, provide laboratory verification of the field results, and verify and identify the occurrence of genetic damages. Results of these studies may provide the first evidence of heritable injury in fish exposed to chronic or acute sources of oil pollution.

Chief Scientist's Recommendation:

To evaluate the recovery of wild stocks of pink salmon in Prince William Sound, it is necessary to monitor embryo mortality in the field. This past season (1995) was the second year in which no statistically significant differences were found in embryo mortality between oiled and unoiled streams. However, two more years of study are required to confirm recovery in odd- and even-year stocks. The investigators have done excellent work to date. I recommend funding the field components of this project. In addition, the search for genetic evidence of heritable injury should continue on a limited basis, mainly through the andogenesis experiments. Current efforts to locate altered DNA sequences should be closed out in FY96, as they appear to have a low prospect of success.

Trustee Council Action:

Fund field monitoring and androgenesis experiments. Close out molecular genetics. Field monitoring should receive funding until there are no statistically significant differences between oiled and unoiled streams for two years for each of the odd- and even-year runs (closeout is FY 98). This is the major monitoring project for the on-going injury to and recovery of pink salmon.

EXXON VALDEZ OIL SPILL -- FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96196		
Project Title:	Genetic Structure of Prince William Sound Pink Salmon		
Proposer:	ADFG		
RPL Request:	ADFG $107.2	Cluster:	Pink Salmon Projects
Total FY 96:	$178.5	Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. Previous work found that wild-stock pink salmon suffered both direct lethal and sublethal injuries as a result of the oil spill. An understanding of the population structure of pink salmon in PWS is essential to assess the impact of these injuries on a population basis and to devise and implement management strategies for restoration. This project is designed to delineate the genetic structure of populations of wild pink salmon inhabiting PWS. (This project was formerly numbered 95320D.)

Chief Scientist's Recommendation:

This project is yielding interesting and worthwhile insights into genetic diversity among wild pink salmon in Prince William Sound, most notably east-west differences within the Sound. This work could have significant benefit for pink salmon management, and I recommend continued funding.

Trustee Council Action:

Fund. This project is designed to determine geographic extent of genetic differences in PWS pink salmon. Knowledge of the location of pink salmon stocks and genetic differences among the stocks in PWS will help refine pink salmon management areas and goals.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96255			
Project Title:	Kenai River Sockeye Salmon Restoration			
Proposer:	ADFG			
RPL Request:	ADFG	$67.2	Cluster:	Sockeye Salmon Program
Total FY 96:	$307.0		Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. Greatly reduced fishing time in upper Cook Inlet in 1989 due to the presence of oil caused sockeye salmon spawning escapements in the Kenai River to exceed the desired amount by three times. The overescapement may have reduced survival of juvenile sockeye salmon. Careful monitoring and possible reduction of Kenai River sockeye salmon harvests may be necessary to ensure adequate escapements. The goal of this project is to restore Kenai River sockeye salmon through improved stock assessment capabilities and more accurate regulation of spawning levels.

Chief Scientist's Recommendation:

This has been an excellent program, the results of which have already proven enormously valuable in managing the upper Cook Inlet mixed-stock fishery to protect Kenai River stocks. I recommend limited additional funding in FY96, after which this program should be taken over by ADFG as part of its normal management responsibilities.

Trustee Council Action:

Fund at reduced amount which reflects the beginning of a transition to agency rather than Trustee Council support; the project will be closed out in FY97. The project has proven successful in providing in-season identification of actual runs that Cook Inlet fishermen are harvesting. The information is used by fisheries managers to modify fishing areas and openings to protect Kenai/Skilak stocks.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96256		
Project Title:	Columbia and Solf Lakes Sockeye Salmon Stocking		
Proposer:	USFS		
RPL Request:	ADFG S17.4	Cluster:	Subsistence Projects
Total FY 96:	$60.8	Cooperating Federal Agencies:	USFS

Project Summary:

This project would assess the feasibility of establishing self-sustaining runs of sockeye salmon in Solf Lake and Columbia Lake. Solf Lake is located in Herring Bay on Knight Island. Data suggest it could annually produce returns of 19,000 to 22,000 sockeye. Columbia Lake is located in Heather Bay near the Columbia Glacier. Data indicate that the lake could annually produce returns of 10,000 to 29,000 sockeye.

Chief Scientist's Recommendation:

There appear to be reasonable prospects for successful establishment of self-sufficient sockeye salmon runs at Solf and possibly Columbia lakes. This is of considerable interest to subsistence users in Prince William Sound, and this project would more fully explore its feasibility. I recommend funding of this feasibility study in FY 1996.

Trustee Council Action:

Fund feasibility study. If feasible, this project could provide sockeye salmon to aid PWS subsistence, sport, and commercial fisheries.

EXXON VALDEZ OIL SPILL -- FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96258A			
Project Title:	Sockeye Salmon Overescapement Project			
Proposer:	ADFG			
RPL Request:	ADFG	$136.4	Cluster:	Sockeye Salmon Program
Total FY 96:	$596.6		Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. This project provides for completion of the Kenai lakes sockeye research program, and closeout of the sockeye monitoring program for Kodiak Island lakes. The Kenai research program investigates the mechanism and extent of injury for the continued depressed returns caused by the 1989 (and previous years) overescapement into the Kenai/Skilak system.

Chief Scientist's Recommendation:

Recent analysis of the extensive limnological and fry data gathered over the last several years indicates a link between fall zooplankton abundance and fry survival in the subsequent year. This may explain sockeye salmon population cycles in these lake systems. If substantiated by further analysis, this is a major breakthrough in understanding of the Kenai R. system and perhaps sockeye salmon rearing lakes in general. I recommend approval of the funds needed to complete the Kenai R. portion of this work in FY96. This project also includes funds for continued assessment of overescapement effects at Red and Akalura lakes on Kodiak Island. The investigators for the Kodiak portion of this project have done an excellent job, but the mixed-stock fishery in waters offshore of Red and Akalura lakes greatly complicates future restoration efforts for these lakes. I do not recommend funding Kodiak work beyond FY 96.

Trustee Council Action:

Fund completion of work on the Kenai River. Close-out work this year on Kodiak portion of project consistent with Chief Scientist's recommendation. Project investigates mechanism of injury to Kenai river sockeye and monitors recovery of Kodiak sockeye runs. Review of FY 95 results indicates significant scientific breakthrough,which may explain the extent and mechanism of overescapement injury on the Kenai River. If the discovery is confirmed, it may significantly advance the understanding of the Kenai River system.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96259			
Project Title:	Restoration of Coghill Lake Sockeye Salmon			
Proposer:	ADFG			
RPL Request:	ADFG	$83.9	Cluster:	Sockeye Salmon Program
Total FY 96:	$265.7		Cooperating Federal Agencies:	USFS

Project Summary:

Continued funding for ongoing project Coghill Lake has historically been a major sockeye producer for PWS. The current production is very low and could jeopardize the sustainability of this sockeye stock without restoration efforts. This project continues a program begun in 1993 to fertilize Coghill Lake to restore the run. A restored sockeye salmon run would provide an important replacement resource for sport and commercial fisheries in PWS.

Chief Scientist's Recommendation:

This project is increasing the productive capacity of Coghill Lake for sockeye salmon through fertilization. The Trustees should continue to support lake fertilization for two more years. I do recommend continued support of the limnological monitoring, but I am concerned that interpretation of the relationship between sockeye production and lake fertilization is confounded by introduction of hatchery-produced pre-smolt, which was done independently of the Trustee-sponsored project. There needs to be further discussion of the objectives and methods of the monitoring program.

Trustee Council Action:

Fund continued fertilization through FY 97, but not hydroacoustic monitoring which has not been very effective. Smolt outmigration and limnological work will continue, but ADFG and PWSAC should undertake an expanded effort to assess returns of wild adults. Project is designed to restore Coghill Lake to its former position as a mainstay of the commercial/sport sockeye fishery in PWS. Although the injury to this fishery was not caused by the oil spill, this project has been conducted on a replacement basis for losses of other fishery resources.

EXXON VALDEZ OIL SPILL -- FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96427			
Project Title:	Harlequin Duck Recovery Monitoring			
Proposer:	ADFG			
RPL Request:	ADFG	$210.1	Cluster:	Nearshore Ecosystem Projects
Total FY 96:	$261.1		Cooperating Federal Agencies:	None

Project Summary:

Continued funding for ongoing project. This project will compare population parameters between oiled and unoiled areas based on population structure, behavior, production, and growth rates. Shoreline boat surveys will be conducted simultaneously. Changes in population size, structure, and production in oiled and unoiled areas and between years will be compared. Continued population monitoring and brood surveys will allow us to assess trends and suggest factors limiting recovery.

Chief Scientist's Recommendation:

Harlequin ducks were seriously impacted by the oil spill, and there continues to be concern about their status, especially in western Prince William Sound. Based on the review session this fall, the investigators have made excellent progress in developing an approach to comparing the health of populations in eastern and western parts of the Sound. This work needs to go forward, and I recommend funding this project in FY 96.

Trustee Council Action:

Fund. This project continues basic assessment of recovery status of harlequin ducks in Prince William Sound.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96507			
Project Title:	EVOS Symposium Publication			
Proposer:	NOAA			
RPL Request:	ADEC	$35.0	Cluster:	Information Support
Total FY 96:	$42.0		Cooperating Federal Agencies:	NOAA

Project Summary:

The *Exxon Valdez* Oil Spill Symposium was held in February 1993. The Trustee Council funded publication and distribution of the symposium proceedings in FY94 with a budget of $102,000. The length of the proceedings is now expected to be 51% longer than originally planned and the American Fisheries Society (AFS), the publisher, needs an additional $35,000 to complete the project.

Chief Scientist's Recommendation:

Not applicable.

Trustee Council Action:

Fund. This project completes the funding necessary to publish and distribute the proceedings of the 1993 Oil Spill Symposium. Publication furthers the Trustee Council's public information goals.

EXXON VALDEZ OIL SPILL – FY 96 WORK PLAN
Revised Program 11 - 6 - 9992

Project Number:	96600		
Project Title:	Program Management		
Proposer:	NOAA		
RPL Request:	ADFG $51.9	Cluster:	Seabird/Forage Fish Ecosystem Project
Total FY 96:	$105.4	Cooperating Federal Agencies:	NOAA

Project Summary:

Continued funding for ongoing project. This project provides support for continued NOAA participation in *Exxon Valdez* damage assessment and management. The program manager of the Office of Oil Damage Assessment and Restoration is responsible for management and oversight of scientists and contractors as they relate to the *Exxon Valdez* Oil Spill Trustee Council. The program manager has responsibility for maintaining information and records on research schedules, work progress, and study products, and works closely with project leaders of studies to ensure that program goals, objectives, and timelines are met.

Chief Scientist's Recommendation:

Not applicable.

Trustee Council Action:

Fund.

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In Memoriam

WALTER MEGANACK, SR.

The *Exxon Valdez* Oil Spill Trustee Council dedicates the 1996 annual report in memory of Walter R. Meganack, Sr.

Walter was chief of Port Graham for 29 years. As the village chief he made great personal sacrifices so that his community might be a better place to live.

Walter supported his growing family through subsistence fishing and hunting, trapping, and commercial fishing. He was deeply disturbed by the effects of the *Exxon Valdez* oil spill on the marine environment he loved and enjoyed, as well as its effect on the people of the region. He spoke out powerfully many times in public forums to make the plight known of the people whose livelihoods and lifestyle were devastated by the spill. His words and his example inspired others to work to clean up the oil spill and to endeavor to restore the injured natural resources.

Walter's commitment, dedication, pride in his Alutiiq heritage, and his eloquence will be greatly missed by all.

there is hope.

MISSION STATEMENT

The *Exxon Valdez* Oil Spill Trustee Council

The mission of the Trustee Council and all participants in council efforts is to efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthy, productive world renowned ecosystem, while taking into account the importance of quality of life and the need for viable opportunities to establish and sustain a reasonable standard of living.

The restoration will be accomplished through the development and implementation of a comprehensive interdisciplinary recovery and rehabilitation program that includes:

- Natural Recovery
- Monitoring and Research
- Resource and Service Restoration
- Habitat Acquisition and Protection
- Resource and Service Enhancement
- Replacement
- Meaningful Public Participation
- Project Evaluation
- Fiscal Accountability
- Efficient Administration

Adopted by the Trustee Council, November 30, 1993.

1996 Status Report

CONTENTS

Cover photograph: Human mask collected in the 1880s from Prince William Sound, now in the collection of Sheldon Jackson Museum, Division of the Alaska State Museums. Courtesy of the Chugach Alaska Corporation.

To obtain additional copies of this document, contact:
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907.278.8008
Toll-free within Alaska 800.478.7745
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LETTER FROM THE EXECUTIVE DIRECTOR

As Walter Meganack, Sr. said in testimony quoted on this report's dedication page, "Where there is life, there is hope." The Trustee Council is providing some of that hope and now finds itself on the leading edge of restoration activities nationwide. In this year's report on the status of the restoration program, we describe a number of achievements which we hope will leave a positive legacy and eventually overshadow the devastation of the 1989 oil spill.

Molly McCammon
Executive Director
Exxon Valdez Oil Spill
Trustee Council

The Trustee Council was formed five years ago to guide the use of the civil settlement funds from the Exxon Valdez oil spill. Since then, the restoration program has matured into one of the largest long-term research and monitoring programs in the nation. In addition, by protecting important habitats, the Council also has provided a long-term "safety net" for the recovery of injured resources and services in the spill area.

In shaping and guiding the restoration program, the Trustee Council emphasizes several key elements:

***Credible science** — The Trustees are funding some of the most exciting scientific research underway anywhere in the world, and we're starting to reap the benefits. In the past five years, fisheries management has advanced by decades through development of new management tools for Cook Inlet and Prince William Sound. The Council's three major ecosystem studies are unprecedented efforts to understand the dynamic processes which support our marine resources and should lead to further improvements in resource management. An active scientific peer review process, including frequent workshops and review sessions, helps ensure that we continue to build upon the knowledge gained each year and that researchers share information and ideas. A clarion call for coming years will be "Publish, publish, publish," in order to provide the greater scientific community access to our research results.*

***Meaningful involvement of the public** — The Council is entrusted with restoring the natural resources and human services injured by the spill. Because these resources belong to the public, the Council is committed to making the public—especially the communities and residents of the spill area—active partners in the restoration process. The 17-member Public Advisory Group plays a strong role in guiding restoration decisions. New Council efforts this year, including the participation of high school students in restoration projects and creation of a network of community liaisons, promise to further strengthen this partnership.*

***A focus on the future** — We are already turning our energies toward further integration of the restoration program and synthesis of scientific findings. The 10th anniversary of the spill is three years away, and planning is underway for that event. Establishment of a long-term reserve account is now leading to further thinking about future use of those funds.*

The Council continues to insist on a program that is cost-effective, follows well-established management principles, and is of the highest quality. The Council contracted for its first audit this year; the results are included in this report.

No manual exists on how to restore a marine ecosystem following an oil spill as large as the Exxon Valdez spill. The Trustee Council process is continually evolving as we seek better ways to achieve our mission, and in the process we are turning abstract restoration goals into concrete achievements. We look forward to the next year of work and invite your involvement.

Molly McCammon

THE *EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL

Bruce M. Botelho
Attorney General
State of Alaska

Michele Brown
Commissioner
Alaska Department of Environmental Conservation

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL PUBLIC ADVISORY GROUP

1995 – 1997

MEMBER	INTEREST
Rupert Andrews	*Sport Hunting & Fishing*
Chris Beck	*Public at Large*
Kim Benton	*Forest Products*
Pamela Brodie	*Environmental*
Sheri Buretta	*Public at Large*
Dave Cobb	*Local Government*
Chip Dennerlein	*Conservation*
James Diehl	*Recreational Users*
John French	*Science/Academic*
James King	*Public at Large*
Nancy Lethcoe	*Commercial Tourism*
Mary McBurney	*Aquaculture*
Vern McCorkle	*Public at Large*
Brenda Schwantes	*Subsistence*
Thea Thomas	*Commercial Fishing*
Charles Totemoff	*Native Landowners*
Gordon Zerbetz	*Public at Large*

EX-OFFICIO MEMBERS

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Representative Alan Austerman

George T. Frampton, Jr.
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for Fish, Wildlife and Parks,
U.S. Department of the Interior

Phil Janik
Alaska Regional Forester
Forest Service, U.S. Department of Agriculture

Steven Pennoyer
Director
Alaska Region, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Frank Rue
Commissioner
Alaska Department of Fish and Game


A L A S K A
South Central
Anchorage
Valdez
Whittier
Cordova
Kenai
LAKE CLARK NAT. PARK & PRESERVE
Cook Inlet
Seward
Chenega
Kinilchik
Anchor Point
Homer
KENAI FJORDS NAT. PARK
Seldovia
Nanwalek
Port Graham
Middleton Is.
Gulf of Alaska
Dillingham
KATMAI NAT. PARK & PRESERVE
Barren Islands
King Salmon
Shuyak Is.
Bristol Bay
Shelikof Strait
AFOGNAK ISAND
Port Lions
Ouzinkie
Kodiak
Larsen Bay
Cape Chiniak
Karluk
KODIAK ISLAND
A L A S K A
Old Harbor
Akhiok
Trinity Is.
Chignik
Perryville
South Central
Oil Spill Area

RECOVERY STATUS

In the seven years since the Exxon Valdez *ran aground on Bligh Reef, several of the marine mammals, birds fish and other resources injured by the spilled oil have recovered or are making progress toward recovery. For others, recovery is coming slowly if at all. Harbor seals, for example, continue to decline at a rate of about six percent per year. Certain oiled seabird colonies have not recovered, although at some locations seabird reproduction appears to have returned to normal. A much-studied pod of killer whales in Prince William Sound has suffered additional losses in the past two years, and the social structure of the pod seems to be disintegrating. Residents in the spill area continue to deal with disruptions to commercial fishing and their subsistence way of life.*

State and federal agencies went into action to identify resources at risk of injury from oil within hours after the spill occurred on March 24, 1989. Data collected about the injuries has been critical in guiding restoration. Following is information summarizing the current status of representative injured resources.

OIL REMAINING IN THE ENVIRONMENT

Oil can still be found in some places in the spill region, although in most locations beaches appear to be normal. Remaining oil is mostly in scattered patches of hard or crumbly asphalt, a thin black coating of tar on boulders or in rock crevices, or layers of oil embedded deep in sediment, protected from weathering by rocks or boulders.

Kodiak survey. During June and July 1995 a team experienced in tracking *Exxon Valdez* oil revisited 30 sites in the Kodiak region where oil was found during the 1990 or 1991 shoreline surveys. The group also visited several locations identified by Kodiak area community members as possibly containing oil remaining from the spill.

The surveyors found almost no oil. In a very few places, the survey team located small isolated patches of mousse, soft asphalt with surface crusts, or tar splotches. Chemical analysis of the oil confirmed it originated from the *Exxon Valdez*. No subsurface oil was found.

This boulder strewn shore on the north side of Shuyak Island was oiled following the 1989 oil spill, but geomorphologist James Gibeaut and environmental specialist Diane Munson did not find any residual oil six years later. This pocket beach was one of 30 sites surveyed for remaining oil in the Kodiak area during 1995.

photo by Gene Piper

In contrast to Kodiak, surface and subsurface oil patches remain in many locations in Prince William Sound, even though most beaches appear free from oil. The contrast between the two regions probably can be attributed to several factors. By the time the oil reached Kodiak beaches, it had absorbed water, was thicker and emulsified, and less able to penetrate beach sediments. Initial oiling in the Kodiak area also was lighter because so much of the oil already had been deposited, dissi-

pated or evaporated by the time it reached those beaches. Also, Kodiak shorelines frequently are buffeted by high energy storm waves that tended to scour off oil residues.

Oiling workshop. The Trustee Council sponsored a workshop in November 1995 to address concerns about oil remaining on Prince William Sound beaches. Workshop participants included residents of Chenega Bay, land and wildlife managers, and a panel of technical experts with broad oil spill and shoreline treatment experience. The workshop focused on the costs, benefits and possible environmental problems associated with limited treatment at sites where significant oil remains. Some of the oiled sites are near Chenega Bay. The Council will consider the results in 1996.

Mussel beds. While most mussels in Prince William Sound are free from oil, some dense mussel beds over fine sediments in sheltered locations are still contaminated. In 1994, scientists and residents from the village of Chenega Bay removed and replaced contaminated sediments underneath 12 oiled mussel beds in Prince William Sound, a restoration technique never attempted before. Monitoring of the restored sites in 1995 showed that oil concentrations in the sediments at all of the restored beds dropped by 98 percent on average. Mussel survival at the cleaned beds was variable but generally good.

photo by L.L. Evans

Pat Harris of the National Oceanic and Atmospheric Administration has collected mussels at specific sites in Prince William Sound at least twice a year since twelve mussel beds were cleaned in 1994. Mussels and sediment analysis indicates oil remaining in the cleaned mussel beds decreased by more than 90 percent.

PINK SALMON

photo by Judy Seitz

SEA project researchers use devices such as this CTD (conductivity/temperature/depth) recorder to collect oceanographic data important to understanding fluctuations in pink salmon and herring populations in Prince William Sound.

Poor pink salmon returns in 1992 and 1993 and the collapse of the Pacific herring population in 1993 in the Sound led to Trustee Council sponsorship in 1994 of a collaborative effort known as the *Sound Ecosystem Assessment*. The SEA project aims to explore and develop models of the processes influencing pink salmon and Pacific herring productivity in Prince William Sound.

The first phase of the project consisted of intensive field work to collect information on physical characteristics of the Sound that affect salmon and herring. These factors include sea temperature, salinity, current movements, and the availability and timing of increases and decreases in plankton, the tiny plants and animals that fish eat. These studies will continue, leading to the development of models that explain and predict ecological processes in the Sound, making management and

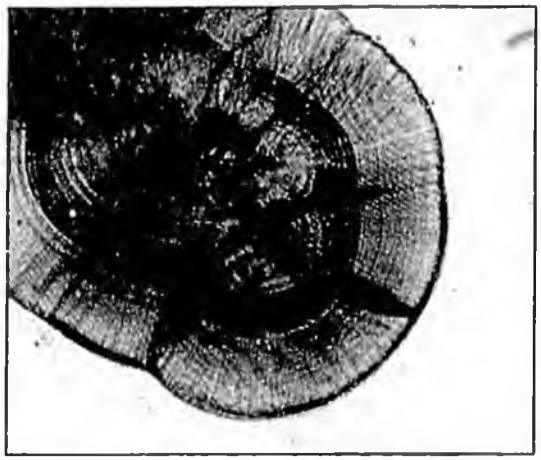


photo by Chris Mond.

A pink salmon carbone (otolith) is about 1/8 inch long, magnified 100 times. The light and dark bands circling the otolith were laid down similar to tree rings in specific patterns by hatchery staff controlling changes in water temperature. The bands enable researchers to identify the year and hatchery where the fish spawned.

restoration of a multitude of marine resources more effective.

In a related pink salmon project, monitoring efforts in both 1994 and 1995 detected no significant difference between survival of wild pink salmon eggs spawned in oiled versus non-oiled streams in Prince William Sound. This data suggests wild stocks may be recovering from direct spill injuries. Researchers expect to monitor oiled and unoiled streams until no significant differences are detected in egg survival for two years in both odd- and even-year pink salmon runs.

photo by C. J. Evans

SEA researcher Mark Clapsadl measures a pollock while Mark Willette prepares to label a jar of tissue samples for analysis. Working in 12-hour shifts, the SEA vessels collected data in Prince William Sound using hydroacoustic equipment, periodically lowering a net to determine exactly what kind of fish the sonar equipment was detecting. The number and species of fish in each catch were recorded and a percentage of the fish were sampled.

In 1995 the Trustee Council placed equipment for otolith thermal mass marking—a method of marking every pink salmon released using fluctuations in water temperature—in hatcheries in Prince William Sound. Fishery managers will use the marking information to set harvest limits, locations and timing of fishery openings to concentrate harvest on hatchery or uninjured wild runs, thus protecting injured wild stocks.

HERRING

Prince William Sound Pacific herring runs collapsed in 1993 and have not yet recovered. The SEA project is investigating the causes of fluctuations in adult herring survival. Additional studies completed in 1995 implicate a common fish virus and a fungus in the catastrophic declines. Researchers are exploring the possibility that stress from oil contamination in intertidal spawning and staging areas made herring more susceptible to these diseases. Work will continue in 1996 to explore the relationships between oil and disease, and to monitor pathogens in wild herring.

SOCKEYE SALMON

Because of closed fisheries in 1989, a large number of sockeye salmon escaped to spawn in the Kenai River system and in Red and Akalura Lakes on Kodiak Island, resulting in decreases in the returns of these valuable fish in subsequent years. This effect was still seen in the numbers of sockeye returning to the Kenai in 1995. The Trustee Council funded projects in 1995 to provide fishery managers with tools to better manage the catch and escapement of spawning sockeye salmon and to ensure the health of future runs.

HARLEQUIN DUCKS

Harlequin ducks feed in intertidal and shallow subtidal habitats where most of the spilled oil initially was stranded. The summer population of harlequins in Prince William Sound

Scientists captured and released more than 350 harlequin ducks during August and September 1995 to take blood samples, measure their size and weight, and assess the ducks' overall condition. The ducks were captured while they were molting and unable to fly. Several team members in kayaks herded groups of harlequins into a chute-and-trap system in shallow water. Adult birds from oiled and unoiled areas of the Sound were also fitted with radio transmitters to track their movements and survival. So far biologists report that most birds have stayed close to their molting sites.

photo by Paul Snyder

is small—less than five thousand birds—and scientists continue to be concerned about poor reproduction and a possible decline in the summer population of birds in the oiled western regions of the Sound.

The Trustee Council initiated the *Nearshore Vertebrate Predator* project in 1995 to understand the key mechanisms that may be constraining recovery of the nearshore ecosystem, using four species as indicators of environmental stress. The species are two fish eaters—river otters and pigeon guillemots, and two invertebrate-feeding species—harlequin ducks and sea otters, which live on shellfish. The project's goal is to determine whether residual oiling effects or limitations in the quantity or quality of food available to these key species is limiting their recovery.

Primary objectives for 1995, the first year of this project, were to assess the condition of harlequin ducks in oiled areas, refine techniques for estimating populations and assessing the overall health of sea otters, and develop techniques for determining the density and distribution of invertebrate prey species. Work in 1996 will also include data collection on river otters and pigeon guillemots.

Researchers in another project funded by the Trustee Council developed a monitoring program to assess the distribution, abundance and reproductive success of harlequin ducks in the eastern versus the western parts of the Sound. In 1995, harlequin pairs with ducklings were observed in eastern Prince William Sound. No ducklings have been seen in the oiled western area since the spill occurred. Researchers will continue monitoring to determine if adult harlequins using the western side of the Sound are not breeding or if they breed elsewhere.

PIGEON GUILLEMOTS

Pigeon guillemots are widely distributed in the spill region. These diving birds nest in rocky cliffs, sometimes in small groups, but usually apart from one another. For reasons still unexplained, these birds had already declined before the oil spill. The present population in Prince William Sound is estimated at only one-third that of the early 1970s. The number of guillemots observed during 1995 surveys was highly variable, and there is not yet any strong evidence that the population is on the rise.

Field biologists monitoring guillemot nests in Prince William Sound and the Barren Islands gathered data on the number of eggs laid, chicks hatched and fledged, and the kind and quantity of fish brought to the chicks by adult birds. These observations, coupled with historical data from other sources, suggest that the kinds and amounts of forage fish available in the region have changed a great deal over the past 20 years. The implications of this shift are significant and far-reaching. A wide variety of other birds and mammals rely on forage fish for an important part of their diets and also may be affected by this shift.

The Trustee Council initiated the *Apex Predator Experiment*, or APEX project, to examine the relationships between forage fish abundance and availability, and populations of pigeon guillemots, common murres and black-legged kittiwakes—key indicators of ecosystem health. None of these species has yet recovered from the spill. This project will continue for several years and should improve understanding of factors limiting recovery from oil spill injuries and management of the spill area ecosystem.

photo by J. F. Evans

Dave Tessler measures the wing of a pigeon guillemot chick. Pigeon guillemots typically nest in openings or crevices in rocky cliffs. As part of the APEX project, researchers monitored the growth, survival, and what kind and how much food the parents brought to pigeon guillemot chicks at several sites in Prince William Sound and the Gulf of Alaska.

COMMON MURRES

Large colonies of murres and other seabirds breed and raise their chicks in the Barren Islands in the northern Gulf of Alaska. Birds at these colonies were killed in great numbers by the oil from the *Exxon Valdez*. In fact, more common murres died because of the spill than any other species. Reproduction of murres at the Barrens was disrupted for several years after the spill, leading to reductions in chick survival. Murre productivity in the Barren Islands has been normal since 1993.

MURRELETS

Marbled murrelets in Prince William Sound had declined for unknown reasons before the spill. Progress was made in 1995 on a reliable survey method to determine how successfully these secretive birds are reproducing in the spill area. Using this method, researchers were able to tell that the birds were producing more chicks in some places than in others. The techniques perfected by Trustee Council biologists may also be useful to researchers of threatened marbled murrelets in other areas.

In August 1995 the Trustee Council added Kittlitz's murrelets and common loons to the list of species injured by the spill. This addition does not reflect new findings. Rather, further analysis resulted in official recognition that the spill effects on these birds were significant.

HARBOR SEALS

Prince William Sound harbor seals continue to decline at a rate of about six percent per year. Harbor seals already were in serious decline throughout the Gulf of Alaska, including the Sound, before the spill. Marine mammal biolo-

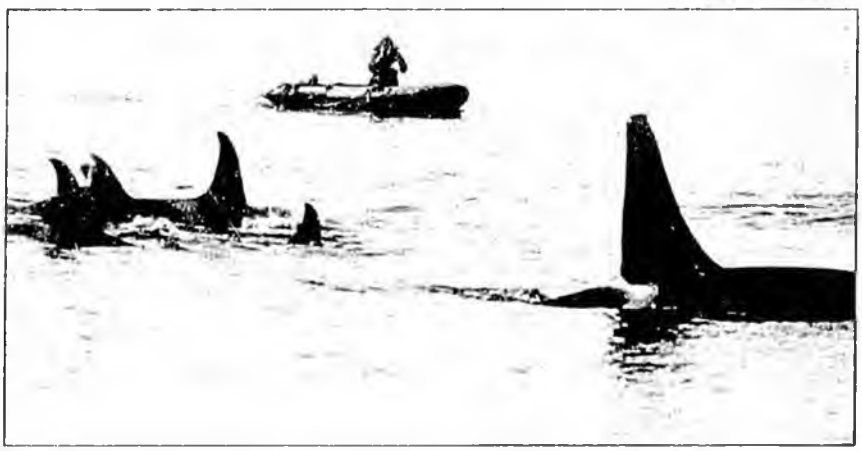
gists have been capturing a few harbor seals every year to sample blood and tissues, measure, weigh and tag the seals. Data from the samples indicates the seals have been exposed to certain diseases in the past, but that there have been no recent outbreaks. Analysis of the fat layer, or blubber, also is providing important information about what the seals are eating.

Harbor seals are a traditional subsistence resource in the oil spill area. Subsistence hunting is affected by the declining seal population, and lack of opportunities to hunt seals has changed the diet of subsistence users. The Trustee Council has funded the Alaska Department of Fish and Game Subsistence Division to work with the Alaska Native Harbor Seal Commission to share and discuss research results, develop a biosampling program to provide information about important life history parameters, and discuss future research and management needs.

unoiled study areas than at oiled areas. In 1995 otters seemed to be reproducing at about the same rate in both areas.

In 1996 blood and tissue samples will be collected from sea otters in oiled parts of Prince William Sound. Analysis will provide a better picture of the overall health of the animals and their ability to resist disease.

photo by Eva Saulitis



Biologist Craig Matkin photographs a group of killer whales from the AB pod in Prince William Sound. Killer whales can be identified using photographs that show the size and shape of the dorsal fin and by markings and coloration of the white saddle patch at the base of the dorsal fin. The dorsal fin of the male on the right has folded over at the tip. Some scientists speculate this is a sign of poor health or stress. Among the females in the group on the left is the smaller fin of a calf.

SEA OTTERS

Immediately following the spill, researchers used boat surveys to find out how many sea otters were present in the wild. Biologists working on Trustee Council projects have now developed and tested methods of counting sea otters from small airplanes which more easily yield precise results. Surveys conducted over the past three years have observed greater sea otter abundance at

KILLER WHALES

Scientists have been particularly concerned about the AB pod of killer whales in Prince William Sound. There were 36 members in this well-documented social group before the spill. Fourteen whales disappeared from the AB pod in 1989 and 1990 and are presumed dead, and no calves were known to be born during those years. Although four calves were added between 1992

and 1994, surveys in 1994 and 1995 indicate five more whales were lost. The link between these losses and the oil spill is only circumstantial, and human interaction could be a factor. However, the losses far exceed normal rates documented over 20 years of study for this and similar killer whale groups in the northern Pacific. In addition to the losses, a subgroup or family of the AB pod was observed in 1995 swimming with another resident pod in the Sound, behavior unheard of in any other killer whale group. These changes in social structure may be leading to the AB pod's disintegration.

Transient killer whales are also found in Prince William Sound. These individuals do not belong to a coherent group. Typically they rely on marine mammals as prey species, whereas resident whales usually eat fish. Because harbor seals are an important prey species for transient whales, researchers are examining the relationship between the decline in harbor seals and predation by transient killer whales.

INTERTIDAL COMMUNITIES

Both the oil spill and subsequent cleanup activities had significant effects on plants and animals that live in the intertidal zone, the area of shoreline between low and high tides. Oil penetrated deeply into many beaches, and despite intensive cleanup and winter storms, still persists in some places.

Small invertebrates and shellfish like limpets, barnacles, marine snails, clams and mussels that live in the intertidal zone are important to sea and river otters, black oystercatchers, harlequin ducks and pigeon guillemots, as well as subsistence users. Although the numbers of many intertidal species have increased since the spill, recovery of the brown seaweed known as *Fucus*, or popweed, in the upper intertidal zone is lagging. Recovery of *Fucus* is important. Many invertebrates need the cover the lush, moist canopy this seaweed provides to survive and multiply.

Although several methods of encouraging the regrowth of *Fucus* have been investigated, none has yet proved practical to implement in large areas. Researchers will continue to monitor natural recovery of the intertidal community.

ARCHAEOLOGICAL RESOURCES

Archaeological sites injured by oil, cleanup activities or related vandalism are different because they are nonrenewable—they cannot recover in the same sense as biological resources. Archaeologists in 1995 continued a program of monitoring and sampling some of the 24 archaeological sites throughout the spill region known to have been injured, and conducted a more extensive exploration of two other sites in Prince William Sound. No new disturbance or vandalism was noted in 1995.

Archaeological artifacts found on public lands during spill response, damage assessment and restoration programs are stored at facilities outside the spill region. The Alutiiq Archaeological Repository in Kodiak, constructed in part with Trustee Council funds, is the only facility in the spill area capable of storing artifacts, but none of the objects found are presently housed there. A project begun in 1995 and continuing in 1996 is exploring options with communities in Prince William Sound and lower Cook Inlet who have expressed interest

photo by E.J. Ivan...

This broken slate ulu, about five inches long, was found with a two-piece wooden handle made of hemlock which was probably originally lashed to the blade with some kind of fiber such as spruce roots. It was found in 1995, more than three feet below the surface at an archaeological site on northeastern Knight Island in Prince William Sound. This site was unknown prior to surveys conducted to identify archaeological sites at risk of damage from cleanup activities. Archaeologist Linda Yarborough estimates the ulu is about one thousand years old, and that it was made and used by ancestors of the Alutiiq people who still inhabit the region.

in returning the artifacts to the spill area for storage and display in appropriate facilities.

SUBSISTENCE

Residents of the 20 communities most directly affected by the oil spill continue to be concerned about the safety of their traditional food resources. Over the past two years, representatives of the Subsistence Division of the Alaska Department of Fish and Game, other agencies and staff from the Restoration Office have assisted community residents with developing restoration projects related to subsistence resources.

One project surveyed octopus populations in cooperation with the villages of Tatitlek and Chenega Bay. Biologists used intertidal and underwater search techniques to assess the populations of chiton and octopus near the villages. Expertise contributed by local residents was key to the success of the pilot project.

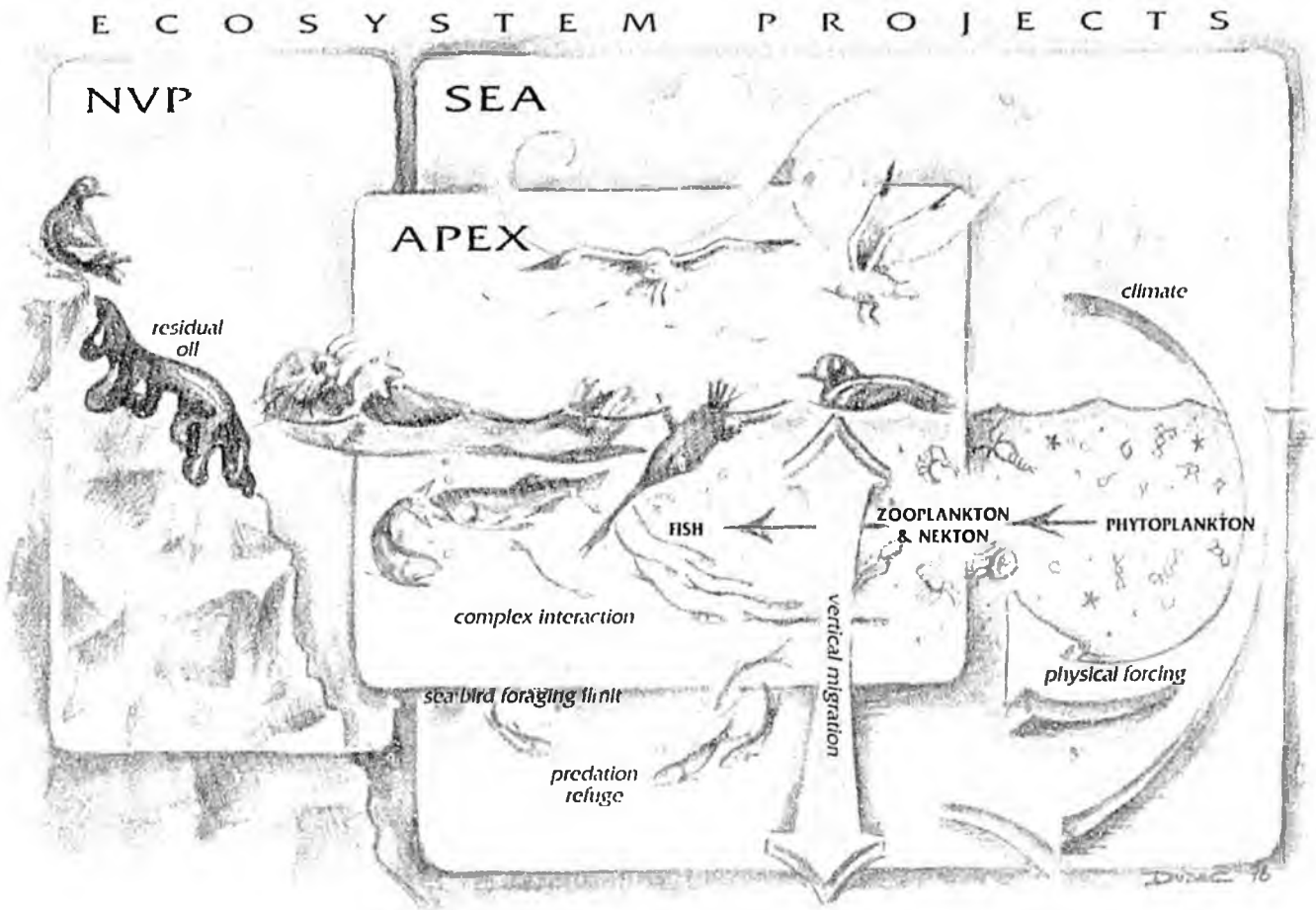
Clams in the spill area were killed or suffered slower growth rates as a result of the spill and cleanup activities. A project in 1995 provided funds for the Qutekcak Shellfish Hatchery in Seward to develop seed clams for use in future restoration work near the villages of Port Graham and Nanwalek on the Kenai Peninsula and Tatitlek in Prince William Sound, as well as other locations. In 1996 the emphasis will be on refining hatchery techniques to increase production.

RESOURCES AND SERVICES INJURED BY THE SPILL

Biological resources listed in this table experienced population-level or continuing sublethal injuries.

INJURED RESOURCES			LOST or REDUCED SERVICES
Biological Resources		Other	Other
Recovering	Not Recovering	Archaeological resources	Commercial fishing
Bald eagle	Common murre	Designated wilderness areas	Passive uses
Black oystercatcher	Harbor seal	Sediments	Recreation & Tourism *(including sport fishing, sport hunting, and other recreation uses)*
Intertidal organisms *(some)*	Harlequin duck		Subsistence
Killer whale	Intertidal organisms *(some)*		
Mussels	Marbled murrelet		
Sockeye salmon *(Red Lake)*	Pacific herring		
Subtidal organisms *(some)*	Pigeon guillemot		
Recovery Unknown	Pink salmon		
Clams	Sea otter		
Common loon	Sockeye salmon *(Kenai & Akalura systems)*		
Cutthroat trout	Subtidal organisms *(some)*		
Dolly Varden			
Kittlitz's murrelet			
River otter			
Rockfish			

Amending the List of Injured Resources and Services. The list of injured resources and services will be reviewed through the Trustee Council's scientific review process as new information becomes available.



Concept by Bob Spies/ Illustration by Debra Dabac

Each of the Trustee Council's major ecosystem projects—Nearshore Vertebrate Predator, APEX, and Sound Ecosystem Assessment—complements the others and provides unique information about recovery of the marine ecosystems in the spill area.

PROGRAM HIGHLIGHTS

The Trustee Council has taken steps to restore resources or accelerate natural recovery wherever possible. Habitat important to the recovery of injured resources has been protected throughout the spill region. Council-funded projects are using state-of-the-art scientific tools and methods to examine the injured resources and improve understanding of the spill's long-term effects. In other cases, data collected and scientific tools developed through restoration projects are providing immediate benefits and will also leave a legacy of improved management and understanding of Alaska's wealth of marine resources. Through an intensive public process, the Trustee Council has developed an integrated, ecosystem-based program that effectively applies the trust funds to restoration needs throughout the spill area.

photo by Karen Shemet

The Alutiiq Dancers from Kodiak entertained participants at a reception during the Community Conference on Subsistence in the Oil Spill.

COMMUNITY INVOLVEMENT

During 1995 the Trustee Council took several steps to more fully involve spill-area communities in the restoration process.

Conference on Subsistence and the Oil Spill. Nearly 80 elders, youth, and other village residents throughout the oil spill region participated in a *Community Conference on Subsistence and the Oil Spill* sponsored by the Trustee Council in September 1995. Major themes of the conference were improving communication between researchers and communities and involving young people in the restoration process.

Working groups at the conference developed ideas for using traditional and local knowledge to help resources recover and to revitalize subsistence lifestyles. Another major theme was the importance of self–reliance and the need to pursue some aspects of subsistence restoration, particularly spiritual healing, independent of Trustee Council support. Participants appointed a steering committee to continue work on goals identified at the conference.

Community Coordinator. Through a contract with Chugach Regional Resources Commission, a Community Involvement Coordinator joined the Restoration Office in December 1995. The Coordinator's tasks are to enhance communication between the Trustee Council and communities affected by the oil spill, increase residents' level of active participation in the restoration process—particularly in ongoing scientific studies—and work with project leaders to integrate local and traditional knowledge into the research and restoration process.

As part of the contract, local facilitators were hired in Chenega Bay, Cordova, Kodiak, Nanwalek, Port Graham, Seward, Tatitlek and

photo by T. J. Evans

Community Coordinator Martha Vlasoff keeps spill-area residents informed of restoration activities and assists with integration of traditional knowledge into restoration projects.

Valdez. An additional facilitator will represent the Alaska Peninsula.

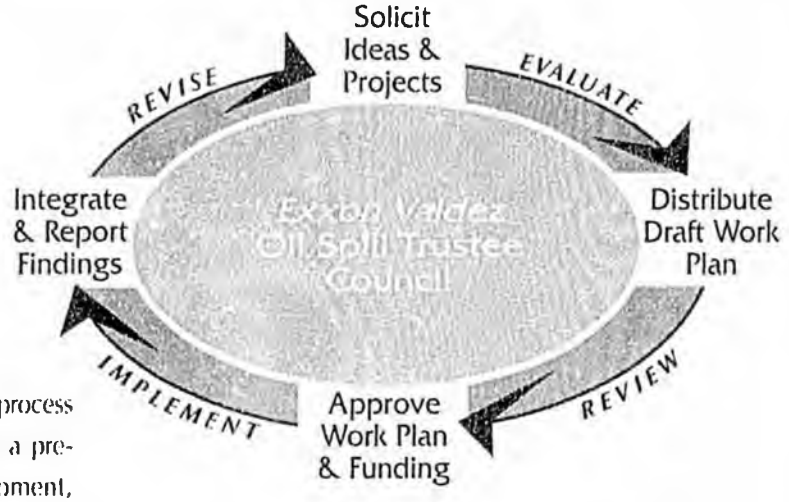
Community-based harbor seal management. A project begun by the Trustee Council in 1994 directly involves subsistence hunters in the efforts to restore harbor seals and sea otters, species that still have not recovered from the spill. The project provides for a continuing exchange of information among hunters, marine mammal biologists and resource management agencies. The hunters contribute valuable traditional knowledge about the habits of seals and sea otters and information about harvest locations. In fiscal year 1996, the project is training hunters to collect tissue samples needed by marine biologists to evaluate the health of seals and otters. The hunters and scientists work together to develop recommendations for subsistence uses of these marine mammals based on restoration project findings. This project will continue in 1996 with a focus on increasing the dialogue between scientists and subsistence users in order to enhance harbor seal recovery.

Other community involvement projects. A 1995 project trained local residents to sample abnormal fish and wildlife resources found near their community and transport samples to laboratories for analysis. Sixty-one volunteers in 20 communities in the oil spill area were trained to collect, preserve, package and ship different types of samples. A network was put in place to transport and analyze the samples, and then to report the results back to the community.

Another project, the Youth Area Watch, involves young people in Prince William Sound communities in the science aspects of restoration projects. This project came together with the harbor seal project in the fall of 1995 when high school students also participated in the biological sampling program described above. As the biologists, hunters, and young people interacted, and students learned to take tissue samples from harbor seals and fish, anatomy and physiology were no longer abstract classroom concepts. The students were involved in hands-on science in their own backyards and at the same time learned about traditional subsistence practices from experienced hunters.

Linda Evans of Nanwalek participated in training sessions during September 1995 to learn how to take samples for analysis from any abnormal fish and wildlife resources found near her village.

photo by Kevin Sheets



The annual Trustee Council adaptive management cycle of soliciting, reviewing, implementing and revising restoration projects provides opportunities for public input in the process and constantly looks for ways to improve the program.

SCIENCE PROGRAM DEVELOPMENT

The Council's adaptive management process is now well established, producing a predictable annual cycle of project development, restoration work, and review. Trustee Council researchers report regularly on the progress of their work to the Chief Scientist and a number of independent peer reviewers internationally known in their fields. A series of intensive review sessions were held last fall and winter to follow up on issues needing attention and to identify areas where the projects could be improved. Addition of a Science Coordinator to the Restoration Office staff also strengthened the review process.

The third annual Restoration Workshop in January 1996 brought together 250 researchers, residents of spill communities, resource managers, and members of the public. Through three days of presentations, small group discussions, and a well-received poster session, the interdisciplinary group exchanged information and fostered collaboration that will benefit the restoration program.

photo by A.J. Evans

The Trustee Council's science team reviews each project prior to Council approval. Standing, left to right: Stan Senner, Trustee Council Science Coordinator; Pete Peterson, Professor of Marine Sciences, Biology & Ecology, University of North Carolina; Robert Spies, Trustee Council Chief Scientist. Seated, left to right: Chris Haney, Wildlife Ecologist, Wilderness Society; Andy Gunther, Assistant Chief Scientist, Applied Marine Sciences; Phil Mundy, Fisheries Scientist; George Rose, Senior Chair in Fisheries Conservation, Memorial University of Newfoundland.

MARINE ECOSYSTEMS

The Trustee Council has been moving steadily toward an ecosystem-based approach for understanding factors affecting recovery of injured resources. This method maximizes the efficiency of research and monitoring efforts and should lead to scientific results with wide application and lasting benefits. Taking an ecosystem approach to restoration means examining certain injured species that can serve as indicators of the health of the whole marine ecosystem and using this information to understand the underlying processes which may be limiting recovery. Work on related questions and resources has been concentrated in three major ecosystem projects. Each of the projects complements the others, and the researchers are sharing data to maximize benefits and avoid duplication.

Scientists working on the *Sound Ecosystem* Assessment project are investigating the causes of fluctuations in pink salmon and Pacific herring in Prince William Sound. Researchers working on this multi-year project have now completed their second field season.

The *Nearshore Vertebrate Predator* project is examining populations of sea otters, river otters, harlequin ducks and pigeon guillemots as key species to indicate the health of the overall nearshore ecosystem, the area where most of the oil was deposited. Studies of invertebrates such as sea urchins, mussels and clams, as well as nearshore fishes, were included in this project to assess the abundance and health of prey populations important to these four predators.

The *Apex Predator Experiment*, or *APEX*, project is exploring the productivity of common murres, pigeon guillemots, and black–legged kittiwakes in Prince William Sound and the Gulf of Alaska in relation to the availability and quality of the small forage fish that are their prey.

NOTEWORTHY SCIENTIFIC & RESTORATION ACHIEVEMENTS

Kenai sockeye predictions. Following the spill in 1989, no fishery openings were allowed in Cook Inlet because of the possibility of fouling the catch with oil. This led to large numbers of fish returning to spawn in the Kenai river and lakes system. Most Kenai River sockeye have a five-year life cycle—two years in the fresh waters of the river system and three at sea. Biologists expected that more spawning adults, therefore more fry and juveniles, would lead to depletion of food resources and starvation of the fry, resulting in a downturn in the returns of the same year class five years later. However, the returns since the spill have not entirely matched this model, and the Trustee Council funded a project to find out why.

Researchers found that the oversized runs have the largest impact on survival of the fish spawned the next year. Sockeye fry emerge in late spring. New zooplankton, the main food resource for juvenile sockeye, enter the food chain in midsummer. If the juvenile sockeye salmon from an oversized run the prior year have reduced the zooplankton population too much, the emerging fry will starve before new zooplankton are available in the summer.

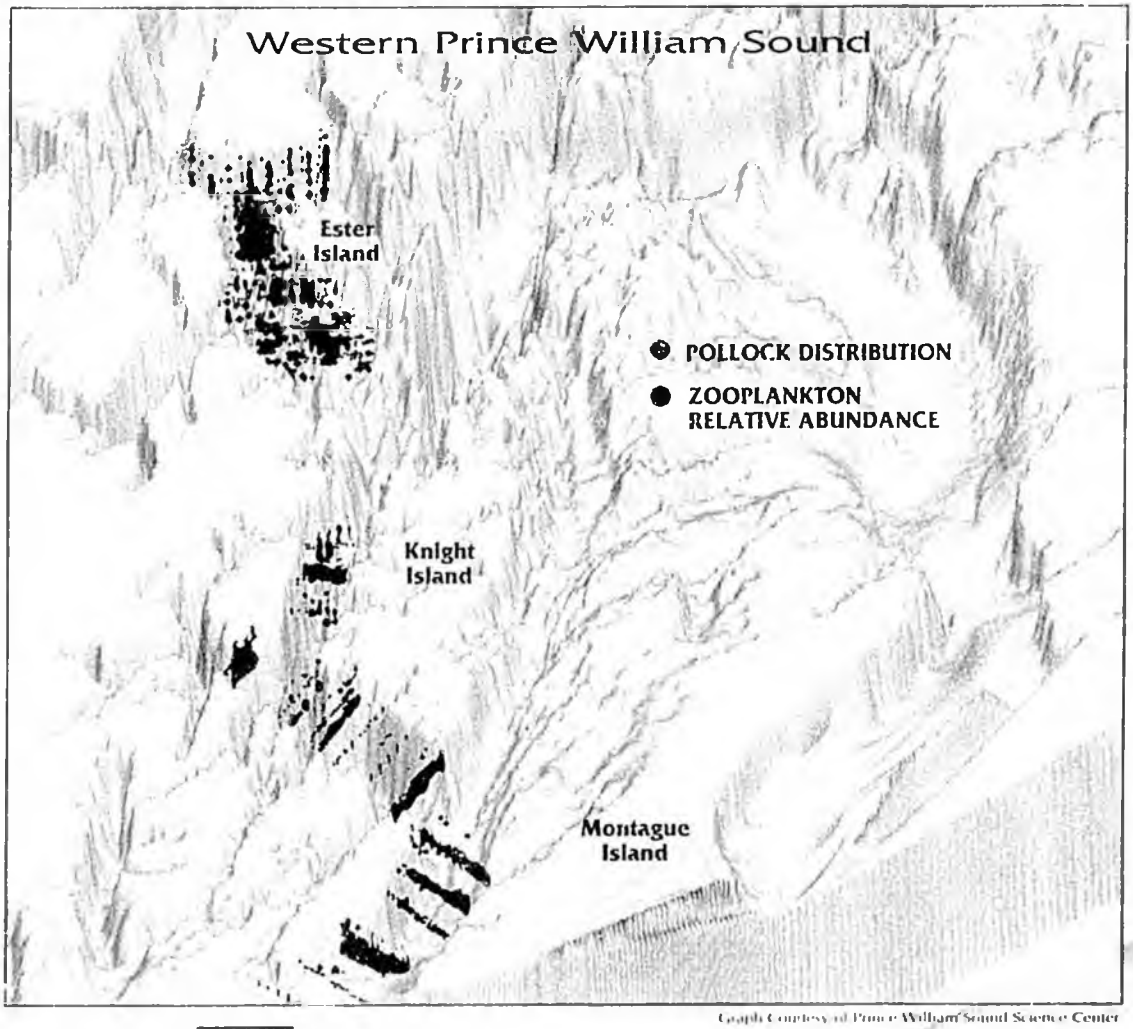
The result is the same—huge fluctuations in the returning fish as succeeding generations return to spawn. If this new theory holds true, fishery managers will be able to predict sockeye returns much more accurately and more effectively manage the fishery.

SEA documentation of pollock in Prince William Sound. One outcome of the research by the Sound Ecosystem Assessment, or SEA, project has been the discovery of a large population of adult and juvenile walleye pollock throughout the Sound.

Towing advanced underwater hydroacoustic equipment, the SEA teams collected data about the sea bottom and the marine life in specific areas of the Sound. Fishing vessels accompanying the research ships used nets to catch samples of whatever the sonar equipment was "hearing," so that the technicians could compare the hydroacoustic data with what was in the nets. By identifying the different signals that represented different kinds of fish caught in the nets, the researchers were able to collect information on the number and kinds of fish present in wide areas of the Sound.

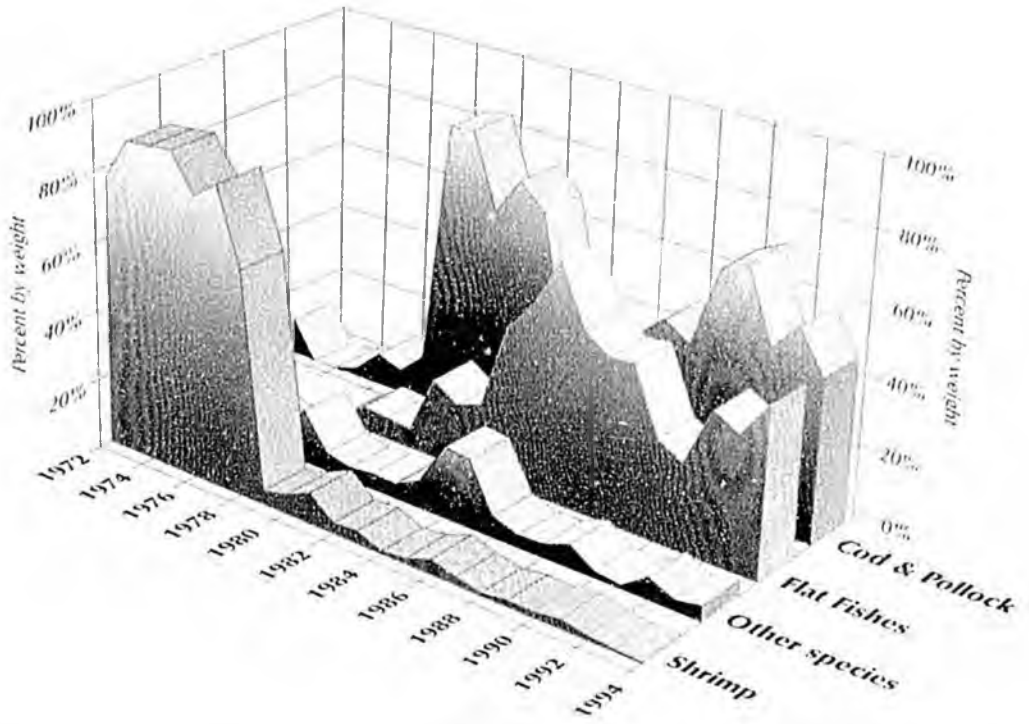
Using these techniques, researchers identified a large population of adult and juvenile pollock throughout southwestern and northern Prince

POLLOCK & ZOOPLANKTON



Graph Courtesy of Prince William Sound Science Center

Surveys conducted in 1994 and 1995 by SEA researchers mapped the presence of pollock and zooplankton in Prince William Sound using hydroacoustic surveys and net samples.



This graph shows the composition by weight of four groups of marine species collected in Gulf of Alaska shrimp trawl surveys between 1972 and 1994 by the National Marine Fisheries Service. APEX researchers noted a large decline in abundance of shrimp and an increase in cod, pollock and flat fishes around 1979. At about the same time, oceanographers in the Gulf observed that the temperature of the water column increased by about two degrees. Data from Paul Anderson, NMFS.

William Sound. The biologists also examined stomach contents of some of the fish they caught, leading to a theory that pollock may be a major predator on juvenile salmon and pollock. Since no one knew before that so many pollock were present, there had been no reason to suspect pollock predation could be a factor in fluctuations in salmon populations.

Upper Cook Inlet sockeye management. The Trustee Council funded a project in 1995 to provide fishery managers the two types of in-season information they need to alleviate oil spill injury to Kenai River sockeye salmon: data about how many fish have returned for use in allocating the commercial harvest, and information about where the returning fish are from within the Kenai River system.

Data about returning fish was collected with hydroacoustic equipment where sockeye salmon are known to congregate in Cook Inlet before they migrate up the Kenai River to spawn. This makes it possible to time fishery openings to protect stocks of these highly prized fish. Prior to 1995, fishery managers in upper Cook Inlet depended on information from commercial drift-fleet sockeye catches to determine the volume of fish returning to spawn.

Unfortunately, this data was incomplete and limited because it could only be gathered when the fishery was actually open. When the fishing fleet was idled to allow salmon to pass by and go up the river to spawn, the fishery managers operated blindly—they could not make accurate, reliable estimates of the volume of fish returning and when the fishery could be reopened. If fishery managers allowed the drift fleet to harvest too many fish, the resource might be over fished and not enough salmon would escape to assure the strength of future runs. Hold the fishermen off too long and too many fish might go up the river, leading to overescapement problems and declines in future runs. The development of hydroacoustic survey methods for sockeye salmon in Upper Cook Inlet will provide a long-lasting tool for use by fishery managers.

Knowledge of the abundance of returning fish is not sufficient, however, when the fishery manager is concerned about one particular fish stock. The hydroacoustic surveys provide an estimate of the fish in Cook Inlet, but they can't determine how many of those fish are from the Kenai River. In another part of the project, scientists identified the genetic "tags" of sockeye from different spawning streams in the Kenai River system. It is now possible to tell fishery managers within 48 hours which stream in the river a particular salmon is from if it was harvested in Cook Inlet. This information provides another powerful tool which can be used to protect spill-damaged stocks by guiding selective harvest in the Inlet.

Changes in distribution of forage fish species. A major shift occurred in the late 1970s in the relative abundance of small fish species critical in the diets of birds and marine mammals in the Gulf of Alaska. Researchers speculate that some of these findings may explain why seabird and marine mammal populations have not recovered from spill injuries.

Data analyzed by researchers in the APEX project indicate that forage species such as capelin and shrimp virtually disappeared around 1979-80, while other fish such as pollock, flounder and cod increased dramatically. At the same time, oceanographers detected a two- to three-degree Fahrenheit increase in the water temperature throughout the region. The effects of this shift on the seabirds and marine mammals of the region may be significant, at least in part because the fish that are on the increase do not seem to have as much nutritional value as those whose abundance has decreased.

The researchers used a variety of data sources to identify this shift. National Marine Fisheries Service and Alaska Department of Fish and Game staff analyzed test trawl data covering the past 40 years to discover when the shift occurred.

Comparing this information with the current situation occurring off the East Coast of the United States and Canada has been revealing. The northern Atlantic off Newfoundland has cooled in the last several years, and Atlantic cod, the main fish resource in the area, have almost disappeared. At the same time, there has been a huge increase in shrimp and other crustacean species. This data is useful to scientists on both sides of the continent and may help to explain natural fluctuations in the marine ecosystem.

National Biological Service personnel also examined data on the diets of seabirds in Prince William Sound collected during the 1970s and 1980s. The earlier studies showed that parent birds brought more sandlance to their chicks before the spill than they have since. Other researchers observed rates of seabird reproduction at sites in Prince William Sound, Cook Inlet and the Gulf of Alaska, and estimated the biomass of forage fishes in the waters around the study sites. They appear to have discovered a direct relationship between the types and quantity of forage fish available and the ability of seabird chicks to survive.

photo by C. J. Evans

Researchers in 1995 examined the kind of food available to injured fish, birds and marine mammals. These juvenile pollock were collected in a fine mesh net in nearshore waters of Prince William Sound.

Harbor seal fatty acid analysis. In late September, 28 harbor seals were captured in Prince William Sound and briefly held to collect samples for analysis of fatty acids, stable isotopes, genetic information and other data. Several species of forage fish were collected at the same time for similar analysis of fatty acid profiles. The early results indicate that the fatty acids in herring and pollock are very different from each other and that the difference is detectable in seal blubber. This may make it possible to tell whether a particular seal is eating more of one kind of fish or the other. Initial analysis of data from southeast Prince William Sound indicates that seals at Channel Island were eating more herring, and seals at Stockdale and Port Chalmers ate more pollock or another fish that has a fatty acid profile similar to pollock. These areas are only five to ten miles apart, yet the seals are apparently eating different prey. Fatty acid analysis will likely provide an additional tool to help determine the reasons for the continued decline in harbor seals throughout the spill region.

photo by Lloyd Lowry

Marine mammal biologist Kathy Frost uses epoxy to attach a satellite transmitter to the back of a harbor seal. The transmitter will relay information for several months about the seal's whereabouts and how deep and for how long it dives. When the seal sheds its fur in the fall, the transmitter will harmlessly fall off.

Reducing marine pollution: The Sound Waste Management Program. Over the past year, representatives of the Prince William Sound communities of Chenega Bay, Cordova, Tatitlek, Whittier and Valdez have been working together to come up with better ways to prevent marine pollution and manage solid waste through a project funded by the Trustee Council and the Alaska Department of Environmental Conservation. Their plan describes ways to reduce sources of continuing pollution that may be impeding recovery of resources injured by the spill. By working together as a region, the communities can save money and make use of more varied means of pollution prevention and control than if each tried to make changes independently. Although the project is still in the planning stages, it received the 1995 Alaska Award of Excellence from the Alaska Municipal League for this innovative approach.

SEALIFE CENTER

The Trustee Council in 1994 authorized $25 million toward construction of the Alaska SeaLife Center in Seward. The SeaLife Center will provide marine research facilities to support restoration work presently not feasible, as well as other science efforts. The scientific program will be guided by the University of Alaska School of Fisheries and Ocean Science. The facility will provide unique and technologically advanced facilities for research on marine mammals, fish and seabirds.