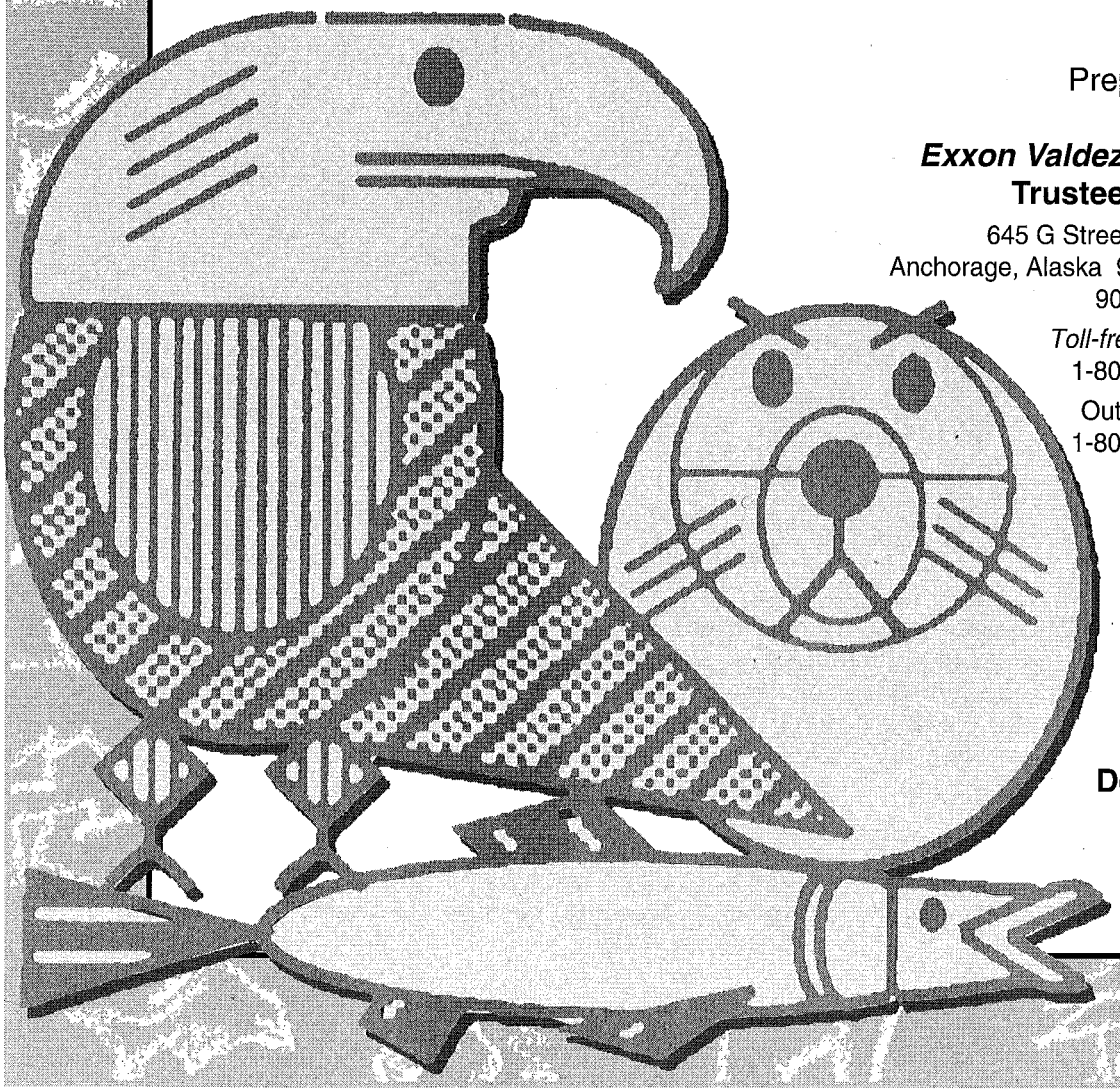
Fiscal Year 1995
Work Plan



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Fiscal Year 1995 Work Plan

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Fiscal Year 1995 Work Plan

Introduction

This document presents the Trustee Council's Fiscal Year 1995 Work Plan. It describes the Trustee Council's fiscal year 1995 program to restore resources and services injured by the 1989 *Exxon Valdez* Oil Spill. The fiscal year of this work plan is the federal fiscal year -- from October 1, 1994 through September 30, 1995.

This work plan includes authorizations that the Trustee Council made on August 23, November 2-3, and December 2, 1994. It does not included recommendations for acquisition of habitat. Evaluation of habitat for restoration purposes is available in separate documents. Finally, the Trustee Council retains the flexibility to authorize additional expenditures at any time as necessary to restore resources and services injured by the spill.

The Fiscal Year 1995 Work Plan includes 84 projects with authorizations totalling $34,834,500 (including the Restoration Reserve). Funding for the 1995 Work Plan is summarized in the table below.

Restoration Category	No. of Projects	FY 1995 Authorization
General Restoration	28	$4,458,200
Monitoring	12	$3,472,300
Research	33	$8,904,300
Habitat Protection and Acquisition[1]	6	$1,744,300
Admin, Science Mgmt, & Public Information	4	$4,255,400
Restoration Reserve	1	$12,000,000
Total:	**84**	**$34,834,500**

[1] This amount does not include purchase costs for individual parcels.

When the Trustee Council authorized funding for projects described in this Work Plan, the Council conditioned the funding on the Executive Director's final approval following scientific and budget review of detailed project descriptions and budgets, and on compliance with National Environmental Policy Act requirements. In addition, individual projects may have specific conditions attached which are described in this Work Plan, in the summary spreadsheet that is Appendix A, or in a series of review memos by the Chief Scientist. The review memos were presented to the Trustee Council on November 2, 1994. They are not included in this Work Plan but are available from the Restoration Office.

Though not part of this Work Plan, on November 2, 1994, the Trustee Council authorized an amount up to $24,956,000 for development of Research Infrastructure Improvements affiliated with the Institute of Marine Sciences in Seward Alaska (known as the Alaska Sealife Center). The resolution authorizing this expenditure is Appendix C.

Solicitation and Review of Projects

In May 1994, the Trustee Council published an *Invitation to Submit Restoration Projects for Fiscal Year 1995*. One-hundred and eighty projects, with a total cost of over $71 million, were submitted.

The Trustee Council's Chief Scientist coordinated a preliminary scientific and technical review of the projects. The projects were also reviewed by the Executive Director, agency staff, and representatives of the Public Advisory Group. Legal staff provided preliminary review of some proposals.

In late August, all proposals and the results of the reviews were published in the *Draft Fiscal Year 1995 Work Plan*. The public comment period on the draft ran from late August until October 3, 1994. Approximately 73 people wrote letters, phoned the restoration office, or spoke at the public meeting about the draft Work Plan.

During the public review period, the Chief Scientist, peer reviewers, the Public Advisory Group, and others attended additional review sessions for groups of projects with integrated objectives. The reviews provided additional scientific and technical assessment, as well as further review of these projects' cost-effectiveness and integration. As a result of the reviews, changes were made in some projects' methodologies, objectives, or coordination with other projects.

Major Emphases of the Restoration Program

This section presents the emphases of the Fiscal Year 1995 Work Plan. These emphases include the efforts to restore pink salmon, sockeye salmon, herring, marine mammals, and subsistence. The section also discusses restoration planning that will occur this winter. In some cases, the Trustee Council may be asked to approve funding for additional projects developed through these planning efforts before the 1995 field season. The Trustee Council's largest research package — the Prince William Sound System Investigation — is discussed as a part of the Council's effort to restore pink salmon and herring.

Pink Salmon Restoration. In 1992 and 1993, wild and hatchery runs of Prince William Sound pink salmon were very poor, and fishing opportunities were severely curtailed. Stronger 1994 pink salmon runs are encouraging; however, wild stocks in the southwest district of the Sound, which were heavily oiled, only met escapement goals

because managers were able to use stock separation information from studies funded by the Trustee Council. Unusually high egg mortality continues in Prince William Sound pink salmon streams that were oiled by the spill.

Restoration of pink salmon is important to restore the resource itself, as well as the commercial fishing and subsistence uses that rely upon healthy pink salmon populations. Pink salmon projects in this Work Plan focus on understanding the reasons for run failures and continued egg mortality, and on obtaining information for management and protection of injured wild stocks. Planning money is also authorized to consider the potential benefits and consequences of supplementing wild stocks.

The total FY 95 cost of pink salmon restoration is $6,627,200. The majority of the cost is for the Prince William Sound System Investigation, which is also the Council's major research effort, and which addresses resources other than pink salmon.

- ***Prince William Sound System Investigation.*** This research group will conduct ecosystem research concerning natural and spill-related factors that may be constraining recovery of pink salmon and herring in Prince William Sound. It also provides information useful to other restoration activities such as those addressing marine mammals and seabirds. The program began in 1994, and fourteen projects in this Work Plan will continue at a cost of $4,612,800 in FY 95.

- ***Research concerning lingering, toxic effects of oil.*** Three studies address the possible lingering toxic effects of oil on pink salmon reproduction and straying. They include laboratory and field tests, and continue to monitor mortality of pink salmon eggs and alevins to determine whether some of the genetic damage caused by the spill is passed down to future generations. The cost of the three studies for FY 95 (95076, 95191A, and 95191B) is $775,900.

- ***Management information to protect wild stocks.*** The ability to manage mixed-stock fisheries to protect wild pink salmon stocks is crucial to the restoration of pink salmon in Prince William Sound. During the last two years, the Trustee Council, ADF&G, Prince William Sound Aquaculture Corporation, and Valdez Fisheries Development Association have contributed funding to mark and recover pink salmon using coded-wire tags. While this method has provided valuable information, it has a major shortcoming — only a fraction of the fish are tagged. Mass marking, both thermal (hatchery populations) and chemical (wild populations), will avoid the shortcomings and, after the first three years, decrease the cost.

  Transitional funding will aid these groups to begin an otolith mass marking system. Funding should be conditioned on a plan by these groups to fully assume long-term operation of the program after Fiscal Year 1997. This Work Plan also includes a third project which complements the marking program by defining the genetic structure of

pink salmon stocks to allow management decisions to be made on stock-specific information. The cost of the three projects for FY 95 (95320B, C, and D) is $1,138,500.

- *Replacement and enhancement activities.* The Prince William Sound Aquaculture Corporation in cooperation with the Native Village of Eyak proposed Project 95093 to actively restore injured stocks at three oiled streams; reduce harvest pressure on injured wild stocks by the use of remote-release hatchery fish; and enhance stocks at three streams important to subsistence users in order to provide replacement fish for subsistence. The project was the subject of a significant review involving PWSAC personnel, the Chief Scientist and peer reviewers, and ADF&G scientists and managers. The review concluded that significant work was required to adequately plan and develop the project including selecting streams and techniques, obtaining permits, and complying with the National Environmental Policy Act. One hundred thousand dollars is allocated to further develop these tasks. Additional funding in FY 95 may be appropriate depending on approval of a revised proposal.

Herring Restoration. Pacific herring are important to commercial fishing and subsistence, and are a key food source to many of the other resources injured by the spill. The 1992, 1993, and 1994 herring runs in Prince William Sound were substantially below the predicted level, and commercial fishing was severely curtailed in 1993 and eliminated in 1994. In both years, the returning herring had viral and fungal infections.

Herring strategies include investigating reasons for the failure of the herring runs; investigating problems caused by the viral and fungal infections; providing information to protect the injured stocks; and monitoring the population. The cost of the Prince William Sound System Investigation is included in the pink salmon discussion. The FY 95 cost of the remaining studies is $1,425,300.

- *Prince William Sound System Investigation.* As explained in the section describing pink salmon restoration, this Work Plan continues the multi-year Prince William Sound System Investigation in order to understand the natural and spill-related factors that are controlling the health and populations of Prince William Sound pink salmon and herring.

- *Research concerning lingering, toxic effects of oil.* Two projects specifically address reproductive impairment and disease that are thought to be caused by the oil spill and that may be continuing to affect the Prince William Sound herring populations. One project (95320S) provides $400,000 for a competitive request for proposals to investigate the herring disease problems that may be the result of exposure to oil. The second project (95074) costs $407,100 and focuses on possible reproductive impairment.

- ***Management information to protect injured stocks.*** One project (95165) investigates possible genetic differences among Prince William Sound herring stocks. The information will be used to assist in managing the harvest of healthy stocks while protecting those that are injured. The FY 95 cost of the project is $105,400.

- ***Monitoring.*** One additional project (95166) will monitor the recovery of Prince William Sound herring by measuring their abundance. Its FY 95 cost is $512,800.

Sockeye Salmon Restoration. In 1994, more sockeye salmon returned to the Kenai River than were expected, and the river system more than met escapement goals. Nevertheless, overwintering survival was only half of normal and the return was only half of what would be expected based on the number of 1989 spawners. In 1994, there was also an excellent outmigration of smolts. However, based on several different data sources, ADF&G predicts that in 1995 there may not be sufficient returns to the river system to meet a minimal escapement goal of 400,000 fish. ADF&G also reports that there is a significant margin of error in the prediction, and in fact, there may be some harvestable excess for the fisheries. If the predicted low run occurs, there would be severe consequences for the commercial and sport fisheries that rely upon the runs.

Sockeye runs in Red and Akalura Lakes in southern Kodiak were also injured by the oil spill. 1994 returns to these lakes were not sufficient to meet escapement goals and allow a harvest. However, the zooplankton appear to have returned to prespill levels in Red Lake. Early emergent fry densities in Red Lake in 1994 suggest that this sockeye run appears to be on the road to recovery. Akalura Lake has not demonstrated any recovery in juvenile fish production.

Restoration for sockeye salmon targets the runs to the Kodiak Island lakes, Kenai River Lakes, and Coghill Lake in Prince William Sound. Activities include three strategies at a total FY 95 cost of $1,569,700.

- ***Monitoring.*** One project (95258), continuing from last year, will monitor fry production, egg-to-spawner ratios, and various limnological parameters in lakes of the Kenai and southern Kodiak regions. Monitoring smolt outmigration has been dropped from the project this year because of problems with the Kenai River smolt counts. FY 95 will be the last year of funding for field data collection for the Kenai River component of Project 95258 if normal runs return in 1995, though laboratory analysis and final report writing may be requested in FY 96. If the 1995 Kenai River runs demonstrate the collapse suggested by low smolt numbers, continued field work may be necessary in future years. The FY 95 cost is $793,400.

- ***Management information to protect injured Kenai stocks.*** This is the fourth year of a five-year program (project 95255) to develop a genetic tool to help the ADF&G manage the mixed-stock Cook Inlet sockeye fisheries and protect the injured Kenai River stocks.

Development of the genetic tool is considered close to completion. If the Kenai River runs return at normal rates, FY 96 funding will be limited to sample analysis and final report preparation. The FY 95 cost is $502,700.

- ***Enhancement and replacement: Coghill Lake Restoration.*** Prior to its recent decline, Coghill Lake in northwest Prince William Sound was an important part of the region's commercial and sport fishery. FY 95 is the third year of a five-year program to fertilize the lake in order to return it to its previous productivity as a replacement fishery for commercial and sport fishing opportunities lost as a result of the spill. The Council may be asked to fund some portion of the fertilization and monitoring costs for FY 96 and 97. The first year-class affected by the fertilization produced approximately 39 sockeye smolts per spawner compared with an average of four smolts before fertilization. This activity, in addition to the recent Board of Fisheries action establishing a no-fishing corridor near Esther Island to minimize Coghill Lake sockeye inception, may return the lake to its previous importance and provide an important replacement resource for fishermen in Prince William Sound. The FY 95 cost of the project (95259) is $273,600.

Marine Mammal Research. Since the mid-1970s, some marine mammals and seabirds that feed in pelagic areas have been declining in the northern Gulf of Alaska and Prince William Sound. These include harbor seals, marbled murrelets, and pigeon guillemots as well as sea lions and kittiwakes. The decline is of great concern to the general public and, especially with respect to harbor seals, to subsistence users. In addition, the potential of the decline to trigger mechanisms of the Endangered Species Act also concerns some spill-area industries. For some resources, the oil spill may be a contributing factor in this continuing decline. For that reason, it is important to understand what factors are constraining recovery of these resources.

Marine mammal research projects address the questions that surround the decline in marine mammals by focusing initially on harbor seals. Collectively, the Marine Mammal Ecosystem Studies attempt a comprehensive approach by investigating harbor seal health, population status, food sources, and the effect of predation by killer whales which are the seals' major predator. The research effort will begin this year and is expected to run for three years. The FY 95 cost of the four projects (95001, 95012, 95064, and 95117-BAA) in the group is $913,200.

To be successful, the research also requires information from the Stable Isotope Project, 95320I, which is explained under "Other Research Projects" below on page 11.

Planning Future Restoration. The Chief Scientist and reviewers concluded that some proposals provided important restoration opportunities and addressed gaps in the FY 95 restoration program, but needed further work before Council funding. Six planning efforts will further develop these proposals. In some cases, the Trustee Council may be asked to approve funding for additional projects developed through these planning efforts before the 1995 field season.

These planning efforts will be coordinated in conjunction with the Trustee Council's workshop, scheduled for mid-January, 1995. As a key element of an adaptive management process, the workshop will focus on review of the results of the 1994 field season, possible modification of FY 95 projects, and planning for FY 96 and beyond.

- ***Project 95163I, Seabird/Forage Fish Interaction, $150,000.*** Populations of several fish-eating bird and mammal species have declined in Prince William Sound since 1972. However, species that feed on benthic invertebrates such as clams in nearshore areas have not declined. This pattern suggests marked changes in the forage fish community. Some forage fish — herring and juvenile salmon — are known to have been injured by the spill. If the spill or other factors disrupted the abundance or distribution of these fish, the changes may be constraining recovery of the pelagic-feeding injured resources including common murres, harbor seals, harlequin ducks, marbled murrelets, and salmon.

  A pilot forage fish study was funded in FY 94 for $606,600. Nine additional forage fish studies totalling approximately $3.2 million were submitted for consideration in FY 95. After a series of review sessions with agency and University of Alaska scientists, the Chief Scientist, and peer reviewers, the project authors developed the nine proposals into an integrated seabird/marine bird research package, rather than a series of independent and overlapping project proposals. The proposed budget for the package was reduced to $1.4 million.

  Review of the revised package by the Chief Scientist and peer reviewers indicated that excellent work resulted in important and useful progress, but that additional work was necessary to lay the groundwork for a successful and cost-efficient long-term research effort. Funding of $150,000 for Project 95163I will be used to hire a project director and begin the logistics and planning necessary for the project. It will begin with a series of workshops and review sessions during the late fall and winter. A revised seabird/forage fish research package may be available for Trustee Council action before the 1995 summer field season.

- ***Project 95025, Nearshore Package: Project Development, $130,000.*** Although other research efforts focus on the pelagic ecosystem, this project will provide funds to further develop a research package for nearshore areas. The nearshore proposals were

reviewed favorably by peer reviewers, but like the proposed forage fish package, need additional work.

The nearshore ecosystem includes the shallow-water areas where shoreline processes predominate. These areas are highly productive and include a wealth of organisms that are food for many of the top-level predators that are not currently recovering from the spill including sea otters, pigeon guillemots, and black oystercatchers. Nearshore areas are also the repository for most of the remaining oil spilled by the *Exxon Valdez.*

Eight projects comprise the nearshore package in the 1995 Work Plan. Collectively, the projects will test the status of recovery for nearshore feeding resources by looking at the abundance and distribution of their prey, such as sea urchins, clams, and mussels. They will also directly compare the fitness of the injured resources between selected oiled and unoiled areas. After review sessions with the Chief Scientist and peer reviewers, the revised package had a cost of approximately $1.2 million. $130,000 is authorized for further work to develop the research package, and begin the logistics and planning for individual projects necessary for the combined project. A revised, further integrated package may be available for Trustee Council action before the 1995 summer field season.

- ***Intertidal/Subtidal Community Structure, no additional funding.*** The intertidal/subtidal community consists primarily of the invertebrates of the nearshore ecosystem. Over the last three years, the Trustee Council has funded several million dollars in research and monitoring projects aimed at increasing understanding of the damages to and opportunities for restoration of the intertidal community. Currently, the lower intertidal zone and, to some extent, the middle intertidal zone are recovering. However, injuries persist in the upper intertidal zone, especially on rocky sheltered shores.

  Thirteen proposals addressing intertidal questions were submitted for the 1995 Work Plan. Following peer review of the proposals, the Chief Scientist concluded that a comprehensive review of restoration strategies and options in the intertidal/subtidal zone should be conducted. A workshop to accomplish this review will be conducted this winter under the direction of the Chief Scientist. Therefore, funding of the intertidal proposals is not at this time (except for Projects 95086C, 95106, and 95285-CLO, which comprise follow-up or close-out of prior years' work; see discussion under "Other Research" and "Other Monitoring"). No FY 95 funding is included for this workshop. It will be accomplished using funds from the peer review contract and from the administrative budget.

- ***Project 95093, PWSAC: Restoration of Pink Salmon Resources and Services, $100,000.*** Funding is authorized to further develop this general restoration project, explained under Pink Salmon Restoration, page 3. Several revisions of this project were reviewed by PWSAC personnel, the Chief Scientist and peer reviewers, and agency scientists and managers. Significant work still remains to adequately plan and prepare the project, including the selection of streams and techniques, obtaining permits, and complying with the National Environmental Policy Act. The Trustee Council authorized $100,000 for further work on these tasks. Additional funding in FY 95 may be appropriate depending on approval of a revised proposal.

- ***Project 95038, Symposium on Seabird Restoration, $74,400.*** Seabirds such as murres and oystercatchers were some of the spill's most-injured resources. Many projects have been submitted to research seabird-related issues, but few to accelerate their recovery. To determine whether cost-effective restoration is possible, funding is included for a project proposed by the Pacific Seabird Group. The group would hold a symposium on seabird restoration in Alaska to evaluate cost-effective techniques to restore seabird populations injured by the oil spill.

- ***Project 95139, Wild Stock Supplementation and Enhancement Workshop, $7,500.*** Examples of efforts to supplement wild fish stocks include constructing spawning channels, providing remote release fish runs, or supplementing an existing stock through egg boxes or net pens. Peer reviewers and other scientists have identified a number of important issues concerning the efficacy of, and potential environmental harm from efforts to supplement wild stocks. In some cases, scientists believed that these efforts could do more harm than good. In other cases, there was concern that the effort was not cost-effective.

  Because there is the potential for effective restoration, yet there also remain many important scientific questions, the Chief Scientist and peer reviewers strongly recommended that these issues be addressed through a comprehensive review rather than through individual project review. $7,500 is authorized to ADF&G for this workshop, though additional resources will be contributed by other agencies in personnel time and travel costs from other project funding, and by the Chief Scientist.

Subsistence Restoration. The effects of the oil spill remain a major concern of subsistence users, especially in Prince William Sound. In the Sound and especially in Chenega Bay, subsistence harvests remain below prespill levels, and users report that they must travel further and spend more time away from the village to acquire food, especially for harbor seals. There is also significant and often-voiced concern about the effects of the remaining oil that is visible on beaches near the village.

In the Kenai communities of Port Graham and Nanwalek, harvests for most resources have returned to prespill levels, but users continue to voice questions about the safety and availability of resources. In Kodiak, overall subsistence use in most communities is similar to prespill levels, though residents express concern over the residual effects of remaining oil.

In most subsistence communities in the spill area, residents say that maintaining their subsistence culture depends on the uninterrupted use of subsistence resources. They voice concern about the effect that the time spent away from subsistence activities has had on the culture, especially for their children.

Subsistence restoration in the 1995 Work Plan includes four strategies. The cost is $1,627,600 (not including the cost of restoration such as pink salmon restoration that is described elsewhere).

- ***Restoration, including research, of natural resources used for subsistence.*** This is the most important subsistence strategy, and the one with the largest expense. It includes all of the projects previously explained for herring and pink salmon, as well as other restoration actions for other species of salmon, harbor seals, and sea otters. This strategy also includes one project to assess possible damage to a subsistence resource: octopus. The project is 95009D, and costs $125,000.

- ***Shoreline cleanup and assessment.*** The presence and visual recognition of shoreline oil affects the safety and useability of subsistence resources. FY 95 projects include a final shoreline assessment for the Kodiak area. The last assessment on Kodiak occurred in 1990. In addition, the obvious presence of oil in southwest Prince William Sound is a continuing problem for the village of Chenega Bay, and has frustrated Trustee Council efforts to find cost-effective methods of removal. One project will review newly available oil removal technologies and, depending on the outcome, conduct a test on a beach near the village. Total cost of these projects (95027, 95266) for FY 95 is $620,700.

- ***Information, planning, and safety.*** Information about the safety and availability of subsistence resources, and the effects of restoration, are important for subsistence use and users. Five projects address these issues. One of them closes out a subsistence planning effort to identify community needs and priorities for restoration to subsistence resources and services injured by the spill. The others address various aspects of

community outreach and involvement. For FY 95, the five projects (95052, 95138, 95244, 95279, and 95428-closeout) collectively cost $602,800.

- ***Enhancement and replacement of subsistence resources.*** Three projects will provide replacement resources for subsistence use. They include providing the second year of a five year effort to create a remote-release run of chinook salmon near Chenega Bay; NEPA compliance activities for a remote-release run of coho salmon near Tatitlek; and a pilot project to test the feasibility of clam restoration using cultured clam stock for Nanwalek, Port Graham, and Tatitlek. The FY 95 cost of these projects (95127, 95131, and 95272) is $279,100.

Some subsistence projects not funded by the Trustee Council as part of the 1995 Work Plan are eligible for funding from $5 million appropriated by the Alaska Legislature from the *Exxon Valdez* criminal settlement. That appropriation is for grants to unincorporated rural communities in the oil spill area to restore, replace, or enhance subsistence resources or services injured or lost as a result of the oil spill.

Other Research Projects

This section describes research projects not listed above. The largest part of the cost is to close out projects funded in FY 94.

- ***Stable isotope and related analyses.*** Stable isotope analysis is a valuable research technique proposed for use by many of the research projects previously explained. The technique can be used to identify major shifts in food sources over the life of an individual animal by comparing older tissue to younger tissue. The information obtained is used for many research purposes — delineating food webs, understanding physiology, etc.

  A number of proposals that use stable isotope analysis were submitted. To ensure consistency in analysis and to lower costs, individual projects will maintain responsibility for collection of material, but that the stable isotope analysis be combined into a single project. That project, 95320I, is part of the Prince William Sound System Investigation at a cost of $200,000. In addition, Project 95121 will provide fatty acid analysis to support other research efforts. Its FY 95 cost is $30,000.

- *Common murres* (Project 95021, $54,000). Factors that may be limiting recovery of murres — one of the most injured resources of the spill area — include food limitation on reproduction or over-winter survival. To test that hypothesis, scientists must learn where murres from injured colonies forage. This study will use a new technology — satellite transmitters recently adapted for murres — to track murres from the Barren Islands colony. The study is a pilot project using six transmitters.

- ***Marbled murrelets*** (Project 95031, $250,000). This project develops a methodology to assess marbled murrelet reproductive success. The project is necessary if information from forage fish investigations (see page 7) is to be used for assessments of problems with marbled murrelet populations.

- ***Closeout of last year's research projects.*** Funding is provided for four research projects to enable them to finish data analysis and report writing from work completed in FY 94. In some cases field studies begun last year will be completed. The combined cost of these projects is $1,056,300
  - 95086C, Herring Bay Monitoring and Restoration Studies, $742,600. Data analysis, final report preparation, and closeout field work for a long-running project investigating intertidal resources near Herring Bay in Prince William Sound. The project's objectives and need for additional work will be reassessed as part of an intertidal workshop to be held this winter (see page 8).

  - 95102-CLO, Closeout: Murrelet Prey and Foraging Habitat In Prince William Sound, $63,800. Data analysis and final report preparation.

  - 95163A, Abundance and Distribution of Forage Fish and their Influence on the Recovery of Injured Resources, $194,800. This will complete a contract begun last year that will provide preliminary information, sampling techniques, and pilot methodologies for more comprehensive forage fish investigations. Additional funding concerning forage fish investigations may come before the Trustee Council at a later date for funding for the FY 95 field season. For more information, see page 7.

  - 95163F, Factors Affecting Recovery of Prince William Sound Pigeon Guillemot Populations, $55,100. Final analysis and report preparation.

Other Monitoring Projects

Monitoring the recovery of injured resources and services has been an important part of the restoration process since the spill occurred. Monitoring is likely to be needed for most resources, at least periodically until the resource recovers. The information monitoring provides is important in designing restoration activities and for determining which activities warrant funding.

Decisions concerning monitoring projects are based on:

- A preliminary monitoring schedule set out in the *Draft Fiscal Year 1995 Work Plan, Summary* (The preliminary monitoring schedule forecasts monitoring needs and frequency through 2001, the end of the settlement period. The table is preliminary and has not been subject to peer review. Peer review and statistical analysis of the schedule will be accomplished this coming winter, and the schedule may change.);
- Scientific review of individual monitoring proposals; and
- An assessment of other restoration needs and opportunities.

The table below lists the injured resources and services that are the primary target of the restoration program, and the projects to monitor them. Where no project is listed for this year, the table lists when the preliminary monitoring schedule forecasts a project to occur.

Monitoring in FY 95

Mammals	
Harbor Seal	Monitoring completed within the Marine Mammal Research Package, Project 95064, described on page 6.
Killer Whale	Monitoring completed within the Marine Mammal Research Package, Project 95012, described on page 6.
Sea Otter	Monitoring, if completed during FY 95, should be part of the Nearshore Investigations, see page 7.
River Otter	Monitoring, if completed during FY 95, should be part of the Nearshore Investigations, see page 7.
Birds	
Bald Eagle	95029, Population Survey of Bald Eagles in Prince William Sound, $48,700.
Black Oystercatcher	No project in FY 95. Monitoring expected in FY 96 (boat surveys).
Common Murre	Monitoring, if completed during FY 95, should be a part of the Revised Forage Fish Investigations, see page 7. However, to closeout FY 94 monitoring: Project 95039, Common Murre Productivity Monitoring, $30,500.
Harlequin Duck	95427, Harlequin Duck Recovery Monitoring, $226,900
Marbled Murrelet	No project in FY 95. Monitoring expected in FY 96 (boat surveys).
Pigeon Guillemot	No project in FY 95. Monitoring expected in FY 96 (boat surveys).

Fish and Shellfish

Cutthroat and Dolly Varden Trout: No project submitted.

Herring	See 95166 in Herring Restoration, page 5.
Mussels	95090, Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska, $438,800.
Pink Salmon	For egg mortality information, monitoring is accomplished as part of 95191B; see Pink Salmon Restoration, page 3. Other information is collected by ADF&G as part of normal agency management.
Rockfish	No monitoring expected.
Sockeye Salmon	See 95258; Sockeye Salmon Restoration, page 5. Also, some information is collected by ADF&G as part of normal agency management.

Other Resources

Archaeology	95007A, Archaeological Site Restoration - Index Site Monitoring, $341,700; the project includes $191,700 to complete Historic Preservation Protection Plans for communities in the spill area.
Intertidal/Subtidal	95106, Subtidal Monitoring: Eelgrass Communities, $200,400. 95285-clo, Closeout: Subtidal Sediment Recovery Monitoring, $121,000. Other intertidal/subtidal monitoring may be a part of the Nearshore Investigation, see page 7.
Persistence of Oil	Shoreline of Kodiak monitored by 95027, see Subsistence Restoration, page 10. Prince William Sound shoreline assessment expected in FY 96. Also, 95026, Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data, $146,900.This project completes data analysis of past intertidal and subtidal monitoring data as recommended by peer reviewers.

Services For monitoring of services, see monitoring of individual resources they depend upon.

Other 95290, Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples, $163,400. This project provides hydrocarbon data interpretation for all restoration projects.

Other General Restoration Projects

This section discusses general restoration projects not previously listed.

- *Archaeology* (Project 95007B, Archaeological Site Restoration, $116,000). This project will finish restoring the last identified archaeological site with severe damage.

- *Reduction of marine pollution.* Two projects address this objective:
  - 95115, Sound Waste Management Plan, $284,500. This project will fund development of a comprehensive plan to identify and remove the major sources of marine pollution and solid waste in Prince William Sound that may be affecting recovery of resources and services injured by the spill. Implementation of solutions to remove the waste will be funded mainly from other sources. Some solutions may be appropriate for funding from the civil settlement in future years.

  - 95417, Carry-forward: Waste Oil Disposal Facilities, $232,200. This project will create a waste oil recycling or disposal pilot program in approximately six communities, selected competitively. The project uses funds carried forward (i.e., authorized but not spent) from FY 94.

- *Finishing general restoration projects begun last year: in-stream enhancement of fish habitat.* A number of instream salmon enhancements were begun in FY 94 and will be completed in FY 95. They include Little Waterfall Creek Barrier Bypass which will enhance habitat for pink and chum salmon on Kodiak Island; pink and chum salmon enhancement in Otter and Shrode Creeks in Prince William Sound; and pink and coho salmon enhancement in the Lowe River near Valdez. An additional component will fund monitoring and evaluation of 25 to 30 structures installed on Montague Island that improve fish spawning and rearing habitat, prevent erosion, and restore natural streamflows. The last project of this type finishes rehabilitation of cutthroat Dolly Varden trout streams in eastern Prince William Sound. The FY 95 cost of these projects (95139A1, B, C1, and C2, and 95043B) is $446,300 much of which is funded with carry forward monies from FY 94.

  In addition, wild stock supplementation efforts will be the subject of a workshop this winter under the guidance of the Chief Scientist. (See project 95139, page 9.)

- *Other closeout projects.* Project 95137 will use $55,800 to finish analysis and report writing for a project that removed coded-wire tags from coho, chum, and chinook salmon in Prince William Sound. The information was used in 1994 for management of these resources. Project 95041 will use $66,500 for follow up surveys to ensure that a 1994 project to remove introduced predators from an island off the Alaska Peninsula was successful. The introduced predators were preying on seabird eggs, and the action will increase seabird populations in the spill area.

Habitat Protection and Acquisition

Habitat Protection and Acquisition are essential components of the Trustee Council's restoration effort. This section of the Work Plan discusses protection activities and those that support the habitat acquisition process. Representatives of the Trustee Council are currently negotiating with landowners for the purchase of land, or interest in land, to protect habitat needed for the recovery of injured resources and services. Purchase costs for individual parcels are ***not*** included in this Work Plan.

However, six projects that support habitat protection and acquisition efforts are funded in FY 95. The FY 95 cost of these project is $1,744,300. The majority of this cost lies within Project 95126 ($1,111,800) and 95126A ($328,700), which includes the agency and contractual support necessary to complete site-inspections, appraisals, and other activities necessary for negotiations and purchase agreements. Project 95126A carries forward funds authorized but not spent in 1994. A related project, 95110, will complete the evaluation of lands nominated for possible habitat acquisition in 1994, including small parcels. It also funds preparation of a final report with an FY 95 cost of $144,000.

Project 95058, Restoration Assistance to Private Landowners, will provide information and assistance to private landowners who wish to minimize impacts to injured resources and services from their on-going or proposed activities. The FY 95 cost is $115,800.

Project 95060, Spruce Bark Beetle Infestation on Injured Fish and Wildlife Species, will use a competitive solicitation to complete a literature search and compilation of existing information on spruce bark beetles. The FY 95 cost is $26,800.

Project 95505B completes a previously funded project for data analysis for existing stream habitat database. The FY 95 cost is $17,200.

Administration, Science Management, and Public Information

Funding is required to prepare work plans, provide independent scientific review, oversee projects and budgets, involve the public, and operate the restoration program. These necessary administrative expenses are not attributable to a particular project. The Public Information, Science Management, and Administration category includes these and other public information and outreach functions, including the Public Advisory Group.

Project 95100 contains the proposed FY 95 budget of $3,666,100 for Administration, Science Management, and Public Information. Project 95089 reflects a major attempt to integrate, synthesize, and make available the information generated by Trustee-sponsored research and restoration activities. It also continues operation of the Oil Spill Public Information Center which has been in existence since 1991. Its FY 95 cost is $522,800.

The one remaining project (95422-clo) provides $20,000 in closeout funding to complete the Environmental Impact Statement process for the *Exxon Valdez* Oil Spill Restoration Plan.

The total FY 95 cost of the three Administration, Science Management, and Public Information projects is $4,208,900. This represents a substantial reduction in costs relative to the FY 94 budget authorized at approximately $5.2 million.

Facility Improvements — Proposed Institute of Marine Science

One project provides closeout funding to complete the Environmental Impact Statement for the proposed facility improvements at the Institute of Marine Science in Seward, also called the Alaska Sealife Center. This project (95199-clo) has a FY 95 cost of $46,500. A proposal to fund the additional research facilities is not part of this Work Plan and was be presented separately to the Trustee Council. The resolution authorizing funding for the project is provided in Appendix C.

Restoration Reserve

Twelve million dollars is set aside for the Restoration Reserve in FY 95. One payment of $12 million was also authorized by the Trustee Council as part of the 1994 Work Plan. Additional deposits of $12 million in each of the remaining seven years of the settlement will provide a reserve of $108 million plus interest. These funds will be used to carry out long-term restoration activities needed after the final payment by Exxon in 2001.

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1995 WORK PLAN -- AUTHORIZED PROJECT FUNDING

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
PWS System Investigation			**$4,612.8**	*Funding subject to conditions in Chief Scientist's PWS System Investigation memo.*
95320A	Salmon Growth and Mortality	ADFG	**$267.8**	Sub-project of effort begun in FY94; extensive peer review of first year progress in October 1994.
95320E	Juvenile Salmon and Herring Integration	ADFG	**$943.1**	See 95320A.
95320G	Phytoplankton and Nutrients	ADFG	**$239.3**	See 95320A.
95320H	Role of Zooplankton in the PWS Ecosystem	ADFG	**$247.4**	See 95320A.
95320I	Isotope Tracers - Food Web Dependencies in PWS (Fish, Marine Mammals, and Birds)	ADFG	**$200.0**	Analysis and interpretation of stable isotope data will be consolidated in one lab to allow for consistent and less expensive analysis.
95320I(2)	Isotope Tracers - Food Webs of Fish	ADFG	**$30.0**	
95320J	Information Systems and Model Development	ADFG	**$836.2**	See 95320A.
95320K	PWSAC: Experimental Fry Release	ADFG	**$47.3**	See 95320A. EA was completed last year.
95320M	Observational Physical Oceanography in PWS and the Gulf of Alaska	ADFG	**$577.8**	See 95320A.
95320N	Nearshore Fish	ADFG	**$635.2**	See 95320A.
95320Q	Avian Predation on Herring Spawn	USFS	**$99.0**	See 95320A.
95320T	Juvenile Herring Growth and Habitat Partitioning	ADFG	**$340.3**	See 95320A. Includes development of herring stock structure model (in conjunction with 95166) as recommended by the Chief Scientist.
95320U	Somatic and Spawning Energetics of Herring/Pollock	ADFG	**$99.4**	See 95320A.
95320Y	Variation in Local Predation Rates on Hatchery-Released Fry	ADFG	**$50.0**	Budget reduced from original; will still allow primary objective to be met.
Other Pink Salmon Projects			**$2,104.4**	*Funding subject to conditions in Chief Scientist's pink salmon and genetics memos.*
95076	Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon	NOAA	**$179.9**	

1995 WORK PLAN -- AUTHORIZED PROJECT FUNDING

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
95093	PWSAC: Restoration of Pink Salmon Resources and Services	ADFG	**$100.0**	Funding is for project planning and development under the guidance of the Chief Scientist. Includes funds for participation of PWSAC and the Native Village of Eyak Tribal Council, and NEPA work if necessary.
95139A1	Carry-forward: Salmon Instream Habitat and Stock Restoration -- Little Waterfall Creek Barrier Bypass	ADFG	**$90.0**	
95191A	Investigating and Monitoring Oil Related Egg and Alevin Mortalities	ADFG	**$265.0**	On-going study effort extensively peer reviewed in prior years.
95191B	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)	NOAA	**$331.0**	On-going study effort extensively peer reviewed in prior years.
95320B	PWS Pink Salmon Stock Identification and Monitoring (CWT)	ADFG	**$260.5**	In conjunction with 95320C, project assists ADF&G in transition to improved tool for managing injured species. Funding conditional on ADF&G developing plan to phase in full agency management by FY98.
95320C	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in PWS	ADFG	**$651.0**	See 95320B. Funding conditional on plan to phase in full agency management by FY98.
95320D	PWS Pink Salmon Genetics	ADFG	**$227.0**	
Other Herring Projects			**$1,425.3**	*Funding subject to conditions in Chief Scientist's herring and genetics memos.*
95074	Herring Reproductive Impairment	NOAA	**$407.1**	
95165	PWS Herring Genetic Stock Identification	ADFG	**$105.4**	
95166	Herring Natal Habitats	ADFG	**$512.8**	Includes development of stock structure model in conjunction with 95320T.
95320S	Disease Impacts on PWS Herring Populations (competitive solicitation under State of Alaska two-step, RFQ-RFP process)	ADFG	**$400.0**	Cost is estimate only, as the actual scope of the project will be determined through the RFP process.
Sockeye Salmon Program			**$1,569.7**	*Funding subject to conditions in Chief Scientist's sockeye and genetics memos.*
95255	Kenai River Sockeye Restoration	ADFG	**$502.7**	Scope of project reduced to development of in-season management tool. ADF&G to develop sockeye restoration plan. If Kenai River runs return at normal rates, FY96 funding will be limited to sample analysis and final report preparation.

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1995 WORK PLAN -- AUTHORIZED PROJECT FUNDING

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
95258	Sockeye Salmon Overescapement (Kenai/ Kodiak)	ADFG	$793.4	Funding for smolt portion of project not included. Funding conditional on development of plan to phase in full agency management.
95259	Restoration of Coghill Lake Sockeye	ADFG	$273.6	Funding conditional on development of plan to phase in full agency management after FY97. Project scaled back to fertilization and monitoring only.
Marine Mammal Ecosystem and Research Projects			$913.2	
95001	Condition and Health of Harbor Seals	ADFG	$172.8	Project targets an injured resource of importance to subsistence communities.
95012	Comprehensive Killer Whale Investigation	NOAA	$298.7	Addresses both recovery monitoring and killer whale predation on harbor seals.
95064	Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in PWS	ADFG	$347.1	Project targets an injured resource of importance to subsistence communities.
95117-BAA	Harbor Seals and EVOS: Blubber and Lipids as Indices of Food Limitation	NOAA	$94.6	Project targets an injured resource of importance to subsistence communities.
Seabird/Forage Fish Interaction			$429.9	
95121	Fatty Acid Signatures of Selected Forage Fish Species in PWS	NOAA	$30.0	
95163A	Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species	NOAA	$194.8	See 95163I.
95163F	Factors Affecting Recovery of PWS Pigeon Guillemot Populations	DOI	$55.1	See 95163I.
95163I	Seabird/Forage Fish Interaction: Program Management and Integration	DOI	$150.0	Planning and development funds for a comprehensive, integrated seabird/forage fish package, including hiring of a project leader. Future funding dependent on approval of a revised package, to come before the Trustee Council at a later date.

1995 WORK PLAN -- AUTHORIZED PROJECT FUNDING

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
Nearshore Ecosystem Studies			**$130.0**	
95025	Nearshore Package: Project Planning and Development	DOI	**$130.0**	Planning and development funds for a comprehensive, integrated nearshore package ($120,000 to NBS, $10,000 to NOAA). Future funding dependent on approval of a revised package, to come before the Trustee Council at a later date.
Intertidal/Subtidal Community Structure			**$1,064.0**	
95086C	Herring Bay Monitoring and Restoration Studies	ADFG	**$742.6**	Funds close-out of project, including *fucus* mat subproject (i.e., no new field work components).
95106	Subtidal Monitoring: Eelgrass Communities	ADFG	**$200.4**	
95285-CLO	Closeout: Subtidal Sediment Recovery Monitoring	NOAA	**$121.0**	
Subsistence Projects			**$1,627.6**	
95009D	Survey of Octopus and Chiton in Intertidal Habitats	USFS	**$125.0**	Funding is to consult with subsistence users, identify and survey harvest areas, and describe oiling history.
95027	Kodiak Shoreline Assessment: Monitoring Surface and Subsurface Oil	ADEC	**$447.8**	Funding is for final comprehensive assessment of Kodiak Island shoreline. Presence of oil is of concern to subsistence communities. Subsistence users will participate in assessment to determine final resolution.
95052	Community Interaction/Use of Traditional Knowledge	ADFG	**$152.0**	Project will increase outreach to spill area residents and communities, access traditional knowledge useful to restoration, and coordinate outreach efforts in other projects through the Anchorage Restoration Office.
95127	Tatitlek Coho Salmon Release Program	ADFG	**$5.0**	Funding is for NEPA compliance. If project meets NEPA approval, proposer may seek implementation funds from the Trustee Council at a later date.
95131	Clam Restoration (Nanwalek, Port Graham, Tatitlek)	ADFG	**$226.9**	Funding is for pilot project. Further expansion would depend on consistently successful production of littleneck clam seed on a small scale.

1995 WORK PLAN -- AUTHORIZED PROJECT FUNDING

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
95138	Elders/Youth Conference	ADFG	$76.4	Conference focus will be discussion of means to assist in the recovery of injured resources. Conference will be coordinated under 95052.
95244	Seal and Sea Otter Cooperative Subsistence Harvest Assistance	ADFG	$93.9	Project would complete two-year effort. Outreach to be coordinated with 95052.
95266	Experimental Shoreline Oil Removal	ADEC	$172.9	Funding is for review of available treatment technologies, and a pilot test on an oiled beach near Chenega as appropriate.
95272	Chenega Chinook Release Program	ADFG	$47.2	EA approved. After four more years, operation will be financially self-sustaining.
95279	Subsistence Restoration Project - Food Safety Testing	ADFG	$180.6	Project completes effort undertaken in previous years. Outreach to be performed through 95052.
95428-CLO	Closeout: Subsistence Planning Project	ADFG	$99.9	Project to be coordinated through 95052.
Other Fish/Shellfish Projects			$419.6	
95043B	Carry-forward: Cutthroat and Dolly Varden Rehabilitation in Western PWS	USFS	$134.8	
95137-CLO	Closeout: Prince William Sound Salmon Stock Identification and Monitoring Studies	ADFG	$55.8	
95139	Wild Stock Supplementation Workshop	ADFG	$7.5	Funding is for ADFG to prepare and participate in workshop on wild stock supplementation efforts, to be held winter 1995.
95139B	Closeout: Otter Creek/Shrode Creek Instream Restoration	USFS	$5.2	
95139C1	Montague Riparian Rehabilitation	USFS	$46.2	Budget includes funding (approximately $7,500) for USFS participation in wild stock supplementation workshop to be held winter 1995 (see 95139). Balance of funding to monitor effectiveness of FY94 work.
95139C2	Carry-forward: Salmon Instream Habitat and Stock Restoration -- Lowe River	ADFG	$170.1	

1995 WORK PLAN -- AUTHORIZED PROJECT FUNDING

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
Other Bird Projects			**$814.8**	
95021	Seasonal Movement and Pelagic Habitat Use by Common Murres from the Barren Islands	DOI	**$54.0**	Funding is for pilot project.
95029	Population Survey of Bald Eagles in PWS	DOI	**$48.7**	If population is determined to be stable, no further Trustee Council funding is appropriate.
95031	Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS	DOI	**$250.0**	Funding is for pilot project to determine effectiveness of study techniques.
95038	Symposium on Seabird Restoration	DOI	**$74.4**	A more comprehensive assessment of what is possible in restoration of seabirds is needed. Funding is conditional on expansion of project objectives to include publication of conference proceedings.
95039	Common Murre Productivity Monitoring	DOI	**$30.5**	Additional funding for project will be considered with seabird/forage fish package.
95041	Introduced Predator Removal from Islands - Follow-up Surveys	DOI	**$66.5**	Project will allow measurable results to be obtained.
95102-CLO	Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound	DOI	**$63.8**	
95427	Harlequin Duck Recovery Monitoring	ADFG	**$226.9**	Funding is for spring population composition and summer brood survey. This level of funding is needed only in FY95, FY98, and FY2001.
Oil Toxicity Projects			**$749.1**	
95026	Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data	ADEC	**$146.9**	Funding is to analyze and correlate existing data sets as recommended by peer reviewers.
95090	Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska	NOAA	**$438.8**	Important follow-up of prior work to determine effectiveness of techniques being used.
95290	Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the *Exxon Valdez* Oil Spill	NOAA	**$163.4**	Ongoing hydrocarbon interpretation and support services.

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1995 WORK PLAN -- AUTHORIZED PROJECT FUNDING

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
Reducing Marine Pollution			**$516.7**	
95115	Sound Waste Management Plan	ADEC	**$284.5**	Goal is to allow recovery of injured resources and services to proceed without the added interference of marine pollution.
95417	Carry-forward: Waste Oil Disposal Facilities	ADEC	**$232.2**	
Archaeology Projects			**$457.7**	
95007A	Archaeological Site Restoration - Index Site Monitoring	ADNR	**$341.7**	Recommend session with peer reviewers and archaeologists from involved agencies to develop less costly methodology for site monitoring. Project should involve local communities.
95007B	Archaeological Site Restoration	USFS	**$116.0**	Funding is for restoration of last identified site with severe damage. Future monitoring of this site, if necessary, is to be rolled into 95007A effort.
Habitat Protection/Acquisition			**$1,744.3**	
95058	Landowner Assistance Program	ADFG	**$115.8**	Fund pilot effort at USFS, ADNR, ADFG to provide restoration assistance to private landowners on an "as needed" basis. Agencies will work with willing landowners only, and restoration recommendations will be advisory only.
95060	Spruce Bark Beetle Impacts	ADEC	**$26.8**	Fund (through RFP) literature search and compilation of existing information on spruce bark beetle. Assessment of extent of infestation in the spill area is normal agency responsibility.
95110-CLO	Closeout: Habitat Protection and Acquisition	ADNR	**$144.0**	
95126	Habitat Protection and Acquisition Support	ADNR	**$1,111.8**	These funds, when combined with carry-forward funding in 95126A, reflect agencies' estimates of their FY95 needs for support of habitat acquisition efforts. These needs will be reevaluated after the current appraisal process is complete. Includes Habitat Work Group funding through January 1, 1995. Evaluation of parcels that come to Trustee agencies' attention after that date will be handled on an "as needed" basis.

Proj. No.	Title	Lead Agency	FY95 Authorization	Conditions/Comments
95126A	Carry-forward: Habitat Protection and Acquisition Support	ADNR	**$328.7**	Carry-forward of appraisal funds authorized but not spent in FY94.
95505B	Data Analysis for Stream Habitat	USFS	**$17.2**	Project will complete data analysis for an existing stream habitat database.
Administration/Science Mgt./Public Info.			**$4,208.9**	
95089	Information Management System	Executive	**$522.8**	Fund development of information management plan and preliminary development of interactive computer program.
95100	Administration, Science Management and Public Information	All	**$3,666.1**	
95422-CLO	Closeout: Restoration Plan EIS/Record of Decision	USFS	**$20.0**	
Institute of Marine Science			**$46.5**	
95199-CLO	Institute of Marine Science - Seward Improvements EIS	ADFG	**$46.5**	
Restoration Reserve			**$12,000.0**	
95424	Restoration Reserve	All	**$12,000.0**	

Authorized for Restoration Projects:	**$22,834.5**
Authorized for Restoration Reserve:	**$12,000.0**
Total Authorized Funding:	**$34,834.5**
Total Number of Projects Authorized for Funding:	**84**

NOTE: All project funding is conditioned on the Executive Director's final approval following scientific and budget review of the detailed project descriptions and budgets, and on compliance with NEPA requirements.
Funding totals do not include funds authorized for development and construction of the Institute of Marine Science (a total of $24.9 million) or for actual acquisition of habitat. Funding total includes $955,600 in carry-forward of FY94 authorization.

Fiscal Year 1995 Work Plan
Authorized Restoration Projects by Resource and Service

This appendix identifies those projects that were authorized for funding by the Trustee Council as of December 2, 1994. Projects are organized according to the resource or service that the project would address. The project budget cited below reflects total authorized FY 95 costs.

This appendix lists resources and services alphabetically to make them easy to find as shown in the Table of Contents. For each injured resource or service, the following information is presented:

Recovery Status: The current condition of the resource or service based on information available at this time.

Recovery Objective: The definition of recovery for that resource or service.

Authorized Projects: A list of authorized FY 95 projects for that resource or service, including the project number, title, total FY 95 cost, and an identification of the project as one of the following six types:

A = Administration, Science Management, and Public Information;
GR = General Restoration;
H = Habitat Protection and Acquisition;
M = Monitoring;
R = Research; or
RR = Restoration Reserve.

Most restoration projects are associated with one or more injured resource or service while others support restoration of all or nearly all injured resources or services. Examples of projects that support restoration of nearly all resources or services include administration, science management, public information, and habitat protection. These projects are identified under the heading "Multiple Resource/Service Projects."

(Note: Because many individual projects address more than one resource or service, the budgets for authorized FY 95 Work Plan projects as shown in this appendix are not additive.)

Authorized Projects for FY 95
Restoration Projects by Resource and Service

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RESOURCE OR SERVICE

MULTIPLE RESOURCE/SERVICE PROJECTS

Archaeological Resources

Recovery Status: Injury to archaeological resources stems from increased looting and vandalism of sites and artifacts, and erosion within and around the sites resulting from cleanup activities. In addition, archaeological artifacts may have been oiled. Injuries attributed to looting and vandalism still occur. These injuries diminish the availability or quality of scientific data and opportunities to learn about the cultural heritage of people in the spill area.

Recovery Objective: Archaeological resources will be considered recovered when spill-related injury ends, and looting and vandalism are at or below pre-spill levels. Restoration cannot regenerate what has been destroyed, but it can prevent further degradation of sites as well as the scientific information that would otherwise be lost.

FY 95 Work Plan Authorization:

95007A	Archaeological Site Restoration /Index Site Monitoring	M	$ 341.7
95007B	Archaeological Site Restoration (Site SEW-488)	GR	116.0

Two archaeological resource projects are authorized for FY 95. One project would "close out" efforts initiated in FY 94, including the preparation of heritage site protection plans and reports for site specific restoration. Once heritage site protection plans are completed in May 1995, additional archaeological restoration projects may be proposed for FY 96. The FY 95 work would also stabilize and excavate an archaeological site in PWS and monitor other sites for continued vandalism and site erosion.

Bald Eagles

Recovery Status: Two hundred to 300 bald eagles may have been killed in the spill. However, population estimates made in 1989, 1990, and 1991 indicate that there may have been an increase in the PWS bald eagle population since the previous survey conducted in 1984. Productivity decreased in 1989, but appeared to have recovered by 1990.

Recovery Objective: Because population and productivity appear to have returned to pre-spill levels, bald eagles may have already recovered from the effects of the spill.

FY 95 Work Plan Authorization:

95029	Population Survey of Bald Eagles in PWS	M	$ 48.7

This project would monitor the recovery of bald eagles using a survey of population. If the bald eagle population is found to be stable or increasing, it would appear that no further Trustee Council funding for this effort would be required.

Black Oystercatchers

Recovery Status: Black oystercatchers are recovering, although oystercatchers may still be exposed to hydrocarbons when feeding in intertidal areas.

Recovery Objective: Black oystercatchers will have recovered when Prince William Sound populations attain pre-spill levels and when reproductive success of nests and growth rates of chicks raised in oiled areas are comparable to those in unoiled areas.

FY 95 Work Plan Authorization:

95041	Introduced Predator Removal - Surveys	GR	$ 66.5
95038	Symposium on Seabird Restoration	GR	74.4

This authorized project would follow up on a predator removal project initiated in FY 94. Funding for a symposium is authorized that would focus on possible marine bird restoration techniques that could also be of benefit to black oystercatchers.

Clams

Recovery Status: Littleneck clams and butter clams on sheltered beaches were killed by oiling and clean-up activities. In addition, growth appeared to be reduced by oil, but determination of sublethal or chronic effects is awaiting final analysis.

Recovery Objective: Clams will have recovered when populations and productivity have returned to levels that would have prevailed in the absence of the oil spill (pre-spill data or non-oiled control sites).

FY 95 Work Plan Authorization:

95131	Clam Restoration (Nanwalek, Pt. Graham, Tatitlek)	GR	$ 226.9

This pilot project for clam restoration would attempt to develop the technology needed to reestablish local clam populations near subsistence communities. (Additionally, there were other projects proposed for FY 95 that would address clams as part of an integrated study effort to understand recovery of vertebrate predators in

the nearshore ecosystem. The FY 95 Work Plan includes an authorization to further plan and develop the nearshore vertebrate predator project. See Project 95025.)

Commercial Fishing

Recovery Status: Commercial fishing was injured through injury to commercial fish species and also through fishing closures. Continuing injuries to commercial fishing may cause hardships for fishermen and related businesses. Each year that commercial fishing remains below pre-spill levels compounds the injury to the fishermen and, in many instances, the communities in which they live and work.

Recovery Objective: Commercial fishing will have recovered when the population levels and distribution of injured or replacement fish used by the commercial fishing industry match conditions that would have existed had the spill not occurred. Because of the difficulty of separating spill-related effects from other changes in fish runs, the Trustee Council may use pre-spill conditions as a substitute measure for conditions that would have existed had the spill not occurred.

FY 95 Work Plan Authorization:

95074	Herring Reproductive Impairment	R	$ 407.1
95076	Effect of Oiled Substrate on Survival and Straying of Pinks	R	179.9
95093	PWSAC: Restoration of Pink Salmon Resources andServices	GR	100.0 *
95139	Wild Stock Supplementation Workshop	GR	7.5 *
95139A1	Carry Forward: Instream Restoration/Little Waterfall	GR	90.0
95139B	Closeout: Instream Restoration/Otter Cr. - Shrode Cr.	GR	5.2
95139C1	Montague Riparian Rehabilitation/Follow-Up	GR	46.2
95139C2	Carry forward: Instream Restoration/Lowe River	GR	170.1
95165	PWS Herring Genetic Stock Identification	GR	105.4
95166	Herring Natal Habitats	M	512.8
95191A	Investigating Oil Related Egg-Alevin Mortality	R	265.0
95191B	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Lab Study)	R	331.0
95255	Kenai River Sockeye Restoration	GR	502.7
95258	Sockeye Salmon Overescapement	M	793.4
95259	Restoration of Coghill Lake Sockeye	GR	273.6
95320A	Salmon Growth and Mortality	R	267.8
95320B	PWS Pink Salmon Stock ID/Monitoring (CWT)	GR	260.5
95320C	Otolith Thermal Marking of Hatchery Pink Salmon	GR	651.0
95320D	PWS Pink Salmon Genetics	GR	227.0
95320E	Juvenile Salmon/Herring Integration	R	943.1
95320N	Nearshore Fish	R	635.2
95320Q	Avian Predation on Herring Spawn	R	99.0
95320S	Disease Impacts on PWS Herring Populations RFQ-RFP	R	400.0
95320T	Juvenile Herring Growth and Habitat Partitioning	R	340.3
95320U	Somatic and Spawning Energetics of Herring/Pollock	R	99.4

* Will include planning efforts during FY 95 to comprehensively address issues concerning the effectiveness and biological implications of in-stream enhancement and other wild stock supplementation efforts.

A great variety of projects are authorized for FY 95 to help restore the commercial fishing service. Many of the projects listed above address specific injured resources such as pink salmon, sockeye salmon or Pacific herring. Several of these are sub-projects within the PWS System Investigation effort (Project 95320) that was initiated in FY 94 to investigate various natural and human factors influencing the health and recovery of pink salmon and herring in PWS. Another focus of the authorized projects involves restoration of sockeye salmon in the Kenai River nursery lake system and other parts of the spill area. Other projects address ecotoxicological issues. Several projects involve improvements to the management of fisheries in order to alleviate pressure and help restore injured wild stocks.

In order to further address issues regarding the effectiveness and biological implications of in-stream restoration and hatchery related supplementation of wild stocks, it is recommended that the FY 95 science program include a workshop focused on these issues.

See also projects proposed for Pacific herring, pink salmon, and sockeye salmon.

Common Murres

Recovery Status: Productivity of common murres shows signs of recovery at some injured colonies (Barren Islands, Paule Bay) but post-spill population counts are still lower than pre-spill estimates and show no sign of recovery.

Recovery Objective: Common murres will have recovered when population trends are increasing significantly at index colonies in the spill area and when reproductive timing and success are within normal bounds. (Normal bounds will be determined by comparing productivity data with information from other murre colonies in the Gulf of Alaska and elsewhere.)

FY 95 Work Plan Authorization:

95021	Seasonal Movement/Pelagic Habitat Use by Common Murres from the Barren Islands	R	$ 54.0 *
95038	Symposium on Seabird Restoration	GR	74.4
95039	Common Murre Productivity Monitoring	M	30.5
95041	Introduced Predator Removal from Islands Follow-up Surveys	GR	66.5

* Funding to support a pilot project.

Authorized FY 95 projects include a pilot project using satellite tracking devices to identify both summer and winter feeding areas of common murres as well as follow-up surveys to assess the effectiveness of predator removal efforts supported by the Trustee Council in FY 94. In order to address questions raised about the effectiveness of innovative techniques such as chick transplantation, vocalization as means of attracting birds, and other strategies the FY 95 work plan includes funding for a symposium that would focus on marine bird restoration. (In addition to the specific projects above, there are a number of research proposals that would focus on issues surrounding forage fish resources that could have important implications for common murres. See Project 95163 under discussion of Multiple Resource/Service Projects: Forage Fish/Marine Bird Research.)

Cutthroat Trout

Recovery Status: Cutthroat trout have grown more slowly in oiled areas than in unoiled areas. Insufficient data are available to determine whether they are recovering.

Recovery Objective: Cutthroat trout will have recovered when growth rates within oiled areas are comparable to those for unoiled areas.

FY 95 Work Plan Authorization:

95043B	Carry-forward: Cutthroat and Dolly Varden Rehabilitation in Western PWS	GR	$134.8

Efforts initiated in FY 94 (but not yet completed) to improve Cutthroat trout habitat in a number of stream or lake systems in PWS would be continued in FY 95.

Designated Wilderness Areas

Recovery Status: The oil spill delivered oil in varying quantities to the waters adjoining the seven areas within the spill area designated as wilderness (including wilderness study areas). Oil was also deposited above the mean high tide line in these areas. During the intense clean-up seasons of 1989 to 1990, hundreds of workers and thousands of pieces of equipment were at work in the spill area. This activity was an unprecedented imposition of people, noise, and activity on the area's undeveloped and normally sparsely occupied landscape.

Recovery Objective: Designated Wilderness Areas will have recovered when oil is no longer encountered in these areas and the public perceives them to be recovered from the spill.

FY 95 Work Plan Authorization: Many projects would help restore designated wilderness areas by restoring injured resources within such areas. No projects that would only address Designated Wilderness Areas were proposed or authorized for FY 95.

Dolly Varden

Recovery Status: Dolly Varden have grown more slowly in oiled areas than in unoiled areas. Insufficient data are available to determine whether they are recovering.

Recovery Objective: Dolly Varden will have recovered when growth rates within oiled areas are comparable to those for unoiled areas.

FY 95 Work Plan Authorization:

95043B	Carry-forward: Cutthroat and Dolly Varden Rehabilitation in Western PWS	GR	$134.8

Efforts initiated in FY 94 (but not yet completed) to improve Dolly Varden habitat in a number of stream or lake systems in PWS will be continued in FY 95.

Harbor Seals

Recovery Status: Harbor seal numbers were declining in Prince William Sound (PWS) before the spill. The oil spill caused population level declines and sublethal or chronic injuries to harbor seals. Following the spill, seals in the oiled area had declined 43%, compared to 11% in the unoiled area. Counts made during the molt at trend count sites in Prince William Sound during 1990-1993 indicate that numbers may have stabilized. However, counts during pupping have continued to decline. It is not known which counts are the best indicator of population status. If the conditions that were causing the population to decline before the spill have improved, normal growth may replace the animals that were lost. However, if conditions continue to be unfavorable, the affected population may continue to decline. Harbor seals are a key subsistence resource in PWS and subsistence hunting is both affected by and may be affecting harbor seal status.

Recovery Objective: Recovery will have occurred when harbor seal population trends are stable or increasing.

FY 95 Work Plan Authorization:

95001	Condition and Health of Harbor Seals	R	$ 172.8
95064	Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in Prince William Sound	R	347.1

95117-BAA	Harbor Seals and EVOS: Blubber and Lipids as Indices of Food Limitation	R	94.6
95244	Seal and Sea Otter Cooperative Subsistence Harvest Assistance	GR	93.9
95320I	Isotope Tracers - Food Web Dependencies	R	200.0

Harbor seals are the focus of five authorized projects for FY 95. These projects include a complementary set of efforts that focus upon the health and condition of seals, as well as the role of harbor seals in the ecosystem both as a predator as well as a prey item. Authorized projects includes continuation of work with subsistence users to assess the impact of subsistence harvests on Harbor seals and to identify ways in which to reduce these impacts. (See also Project 95012 under the discussion of Killer Whale. In addition to the projects above, there are a number of research proposals that would focus on issues surrounding forage fish resources that could have important implications for harbor seals. See also Project 95163 under discussion of Multiple Resource/Service Projects: Forage Fish/Marine Bird Research.)

Harlequin Ducks

Recovery Status: There are indications of reduced densities of harlequins in the breeding season; a declining trend in the summer, post-breeding population; and very poor production of young in western Prince William Sound.

Recovery Objective: Harlequin ducks will have recovered when breeding and post-breeding season densities and production of young return to estimated pre-spill levels, or when there are no differences in these parameters between oiled and unoiled areas.

FY 95 Work Plan Authorization:

95025	Nearshore Ecosystem: Project Planning-Development	R	$ 130.0 *
95427	Harlequin Duck Recovery Monitoring	M	226.9

* Funding is for continued planning to address issues pertaining to nearshore vertebrate predators and the ecosystem upon which they depend.

Projects authorized for FY 95 include continuation of efforts initiated in FY 94 (Project 94427) for development of refined monitoring techniques to ensure accurate identification of harlequin population age/sex structure. Additionally, planning funds are authorized for a continued effort to develop a nearshore vertebrate predator ecosystem project that could provide important insights into the reasons that harlequin ducks are not recovering.

Intertidal Organisms

Recovery Status: The lower intertidal zone and, to some extent, the middle intertidal zone are recovering. However, injuries persist in the upper intertidal zone, especially on rocky sheltered shores. Recovery of this zone appears to depend, in part, on the return of adult *Fucus* in large numbers.

Recovery Objective: Each intertidal elevation (lower, middle, or upper) will have recovered when community composition, population abundance of component species, age class distribution and ecosystem functions and services in each injured intertidal habitat have returned to levels that would have prevailed in the absence of the oil spill.

FY 95 Work Plan Authorization:

95009D	Survey and Experimental Enhancement of Octopuses in Intertidal Habitat	R	$ 125.0
95025	Nearshore Ecosystem: Project Planning-Development	R	130.0 *
95026	Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data	M	146.9
95027	Kodiak Shoreline Assessment	M	447.8
95086C	Herring Bay Monitoring and Restoration Studies of Injured Nearshore Vertebrate Predators	R	742.6
95090	Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska	M	438.8
95266	Experimental Shoreline Oil Removal	GR	172.9

* Funding for continued planning of integrated project to address issues pertaining to nearshore vertebrate predators and the ecosystem upon which they depend.

FY 95 project funding for continued work at the Herring Bay monitoring site is authorized with the understanding that a focused science management workshop will be conducted during the winter to assess the future direction of intertidal work. Other authorized projects include follow-up of mussel bed restoration work initiated in FY 94; a Kodiak shoreline assessment effort that will work with communities in the Kodiak area to identify the presence of shoreline oiling remaining from the spill; a review and assessment of available hydrocarbon removal and cleansing techniques; and a data integration effort. Additionally, funding is authorized for continued planning of a project to address issues pertaining to nearshore vertebrate predators and the ecosystem upon which they depend.

Killer Whales

Recovery Status: Thirteen whales disappeared from one pod in Prince William Sound between 1988 and 1990. The injured pod is growing again.

Recovery Objective: Killer whales will have recovered when the injured pod grows to at least 36 individuals (1988 level).

FY 95 Work Plan Authorization:

95012	Comprehensive Killer Whale Investigation	R	$ 298.7

The authorized project would address issues pertaining to the prey resources being consumed by killer whales (including harbor seals), an effort to determine whether there are distinct genetic stocks of killer whales in PWS, and continued monitoring of recovery through photographic identification.

Marbled Murrelets

Recovery Status: It has been estimated that 8,000 to 12,000 murrelets may have been killed by the oil spill (about 5-10% of the current population in the affected area). Marbled murrelet populations in Prince William Sound were in decline before the spill. The oil spill probably increased the pre-spill rate of decline for this species in the spill area, although the incremental injury is difficult to estimate. The causes of the pre-spill decline are unknown.

Recovery Objective: Marbled murrelets will have recovered when population trends are increasing.

FY 95 Work Plan Authorization:

95031	Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS	R	$ 250.0
95038	Symposium on Seabird Restoration	GR	74.4
95102-CLO	Closeout: Murrelet Prey and Foraging Habitat in PWS	R	63.8

Authorized projects include continuation and closeout of research regarding murrelet prey and foraging habitat and initiation of a further effort in FY 95 to examine murrelet reproductive success as a factor that may be limiting recovery.

Pacific Herring

Recovery Status: Pacific herring studies have demonstrated egg mortality and larval deformities. Populations may have declined, but there is uncertainty as to the full extent and mechanism of injury. However, the stocks and dependent fisheries in Prince William Sound are not healthy, as indicated by the low spawning biomass in 1993 and 1994 and the resultant elimination of the fisheries in those years.

Recovery Objective: Pacific herring will have recovered when populations are healthy and productive and exist at pre-spill abundance.

FY 95 Work Plan Authorization:

95074	Herring Reproductive Impairment	R	$407.1
95165	PWS Herring Genetic Stock Identification	GR	105.4
95166	Herring Natal Habitats	M	512.8
95320E	Juvenile Salmon and Herring Integration	R	943.1
95320N	Nearshore Fish	R	635.2
95320Q	Avian Predation on Herring Spawn	R	99.0
95320S	Disease Impacts on PWS Herring Populations/RFQ-RFP	R	400.0
95320T	Juvenile Herring Growth and Habitat Partitioning	R	340.3
95320U	Somatic and Spawning Energetics of Herring/Pollock	R	99.4

Authorized projects FY 95 include nine projects that directly or indirectly address restoration of Pacific herring. These include six sub-projects within the PWS System Investigation (Project 95320) and a closely related investigation of herring natal habitats that would provide information about herring egg survival. Another project (initially authorized in FY 94 but delayed due to a failure of the herring run in 1994) would attempt to identify herring stock structure as a means to improve harvest management.

Passive Use

Recovery Status: Passive use of resources includes the appreciation of the aesthetic and intrinsic values of undisturbed areas, the value derived from simply knowing that a resource exists, and other non-use values. Injuries to passive uses are tied to public perceptions of injured resources.

Recovery Objective: Passive uses will have recovered when people perceive that aesthetic and intrinsic values associated with the spill area are no longer diminished by the oil spill.

FY 95 Work Plan Authorization: Any project that aids the recovery of injured resources or prevents further injuries will assist in the recovery of passive use values. No FY 95 project proposals were submitted that address only passive use. Because the recovery of passive uses requires that people know when recovery has

occurred, public information efforts will continue to play an important role in the restoration of passive uses. In this way, public information elements of the Administration budget support recovery of passive use.

Pigeon Guillemots

Recovery Status: It has been estimated that between 1,500-3,000 pigeon guillemots may have been killed by the oil spill (perhaps 10-15% of the pigeon guillemot population in the Gulf of Alaska). The pigeon guillemot population in Prince William Sound was in decline before the spill. The oil spill probably increased the rate of decline for this species in the spill area, although the magnitude of the incremental injury is difficult to estimate. The causes of the pre-spill decline are unknown.

Recovery Objective: Pigeon guillemots will have recovered when populations are stable or increasing.

FY 95 Work Plan Authorization:

95025	Nearshore Package: Project Planning and Development	R	$ 130.0 *
95038	Symposium on Seabird Restoration	GR	74.4
95041	Introduced Predator Removal from Islands--Surveys	GR	66.5
95163F	Factors Affecting Recovery of PWS Pigeon Guillemots (formerly 95173)	R	55.1
95163I	Seabird-Forage Fish Interaction: Program Management and Integration	R	150.0 **

* Funding for continued planning to address issues pertaining to nearshore vertebrate predators and the ecosystem upon which they depend. This planning effort includes consideration of Pigeon guillemots as a bioindicator of ecosystem health.

** Funding for continued planning to address issues pertaining to seabird and forage fish interactions.

Authorized FY 95 Work Plan efforts include follow-up surveys to document the success of predator removal efforts undertaken in FY 94. Other authorized efforts include funding for two planning efforts pertaining to restoration of nearshore vertebrate predators and the ecosystem upon which they depend (Project 95025) and another effort pertaining to seabird/forage fish interactions (Project 95163I). Additionally, authorized FY 95 work includes funding for a symposium that would focus on possible seabird restoration techniques.

Pink Salmon

Recovery Status: Pink salmon studies have demonstrated egg mortality, fry deformities, and reduced growth in juveniles. Populations may have declined, but there is uncertainty as to the full extent and mechanism of injury. However, there is evidence of continued damage in some stocks from exposure to oil, and there has been a precipitous decline to both wild and hatchery stocks of pink salmon in Prince

William Sound since 1991.

Recovery Objective: Pink salmon will have recovered when populations are healthy and productive and exist at pre-spill abundance (an indication of recovery is when egg mortalities in oiled areas match pre-spill level or levels in unoiled areas.)

FY 95 Work Plan Authorization:

95076	Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon	R	$ 179.9
95093	PWSAC: Restoration of Pink Salmon Resources and Services	GR	100.0 *
95137-CLO	Closeout: PWS Salmon Stock Identification and Monitoring Studies	GR	55.8
95139	Wild Stock Supplementation Workshop	GR	7.5 *
95139A1	Carry-forward: Salmon Instream Restoration Little Waterfall Barrier Bypass	GR	90.0
95139B	Closeout: Instream Restoration/Otter Cr. - Shrode Cr.	GR	5.2
95139C1	Carry-forward: Instream Restoration - Lowe River	GR	170.1
95191A	Investigating and Monitoring Oil Related Egg and Alevin Mortalities	R	265.0
95191B	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Lab Study)	R	331.0
95320A	Salmon Growth and Mortality	R	267.8
95320B	PWS Pink Salmon Stock Identification and Monitoring (CWT)	GR	260.5
95320C	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in Prince William Sound	GR	651.0
95320D	PWS Pink Salmon Genetics	GR	227.0
95320E	Juvenile Salmon and Herring Integration	R	943.1
95320N	Nearshore Fish	R	635.2
95320Y	Variation in Local Predation Rates on Hatchery-Released Fry	R	50.0

* Will include planning during FY 95 to comprehensively address issues concerning the effectiveness and biological implications of in-stream enhancement and other wild stock supplementation efforts.

Projects authorized for FY 95 involve a combination of research and general restoration efforts including continuation of ecotoxicological investigations regarding long-term heritable genetic damage in pink salmon due to oil exposure; a project to examine the effect of oiling on straying among pink salmon; and several interrelated sub-projects that are part of the PWS System Investigation (95320). Additionally, a number of proposals for FY 95 involved wild stock in-stream restoration or other proposed efforts involving wild stock supplementation, many of which called for release of hatchery-reared fish. Funding is authorized to continue peer review and planning related to such proposals over the coming year (see Projects 95093 and 95139). It is intended that a science management workshop be held to comprehensively address issues concerning the effectiveness of in-stream restoration and other supplementation efforts as well as the biological implications to wild stocks.

Recreation and Tourism

Recovery Status: The spill disrupted use of the spill area for recreation and tourism. Resources important for wildlife viewing include killer whales, sea otters, harbor seals, bald eagles, and various seabirds. Residual oil exists on some beaches with high value for recreation and it may decrease the quality of recreational experiences and discourage recreational use of these beaches. Closures on sport hunting and fishing also affected use of the spill area for recreation and tourism. Sport fishing resources include salmon, rockfish, Dolly Varden, and cutthroat trout. Harlequin duck are hunted in the spill area, although in some areas hunting has been restricted. Recreation was also affected by changes in human use in response to the spill. For example, displacement of use from oiled areas to unoiled areas increased management problems and facility use in unoiled areas. Some facilities like the Green Island cabin and the Fleming Spit camp area were injured by clean-up workers.

Recovery Objective: Recreation and tourism will have recovered, in large part, when the fish and wildlife resources on which they depend have recovered, recreation use of oiled beaches is no longer impaired, and facilities and management capabilities can accommodate changes in human use.

FY 95 Work Plan Authorization:

95043B	Cutthroat and Dolly Varden Rehabilitation in Western PWS	GR	$ 134.8
95266	Experimental Shoreline Oil Removal	GR	172.9

While numerous authorized projects have important implications for the restoration of Recreation and Tourism services, there are two projects with particular significance for this service. These include on-going in-stream restoration efforts to improve Cutthroat and Dolly Varden sport fishing and an experimental shoreline oil removal project to evaluate current techniques and technology that are available to remove residual oil in the spill area.

River Otters

Recovery Status: River otters have suffered sublethal effects from the spill and continuing exposure to hydrocarbons.

Recovery Objectives: Indications of recovery are when habitat use, food habitat, and physiological indices have returned to pre-spill conditions.

FY 95 Work Plan Authorization:

95025	Nearshore Ecosystem: Project Planning - Development	R	$ 130.0

Funding is authorized for planning pertaining to nearshore vertebrate predators and the ecosystem upon which they depend, including consideration of River otters as a bioindicator of ecosystem health.

Rockfish

Recovery Status: Dead adult rockfish were recovered following the oil spill. Other rockfish were exposed to hydrocarbons and showed sublethal effects. Furthermore, closures to salmon fisheries increased fishing pressures on rockfish which may be affecting their population. However, the extent and mechanism of injury to this species are unknown.

Recovery Objective: Without further study, recovery cannot be defined.

FY 95 Work Plan Authorization: No projects are authorized for funding in FY 95. The final damage assessment report (ST6/Rockfish Damage Assessment) for this resource should be completed and approved by the Chief Scientist before further commitment of Trustee Council funding. A maximum sustained yield for rockfish needs to be determined before a restoration objective can be defined.

Sea Otters

Recovery Status: Sea otters do not appear to be recovering, but are expected to eventually recover to their pre-spill population. Exactly what population increases would constitute recovery is uncertain, as there is no population data from 1986 to 1989, and the population may have been increasing in Eastern Prince William Sound during that time. In addition, only large changes in the population can be reliably detected with current measuring techniques. However, there are recent indications that the patterns of juvenile and mid-aged mortalities are returning to pre-spill conditions.

Recovery Objective: Sea otters will be considered recovered when population abundance and distribution are comparable to pre-spill abundance and distribution, and when all ages appear healthy.

FY 95 Work Plan Authorization:

95025	Nearshore Ecosystem: Planning - Development	R	$ 130.0
95244	Seal and Sea Otter Cooperative Subsistence Harvest Assistance	GR	93.9

Authorized projects includes continuation of on-going work with subsistence users to assess the impact of subsistence harvests on sea otters and to identify ways to reduce these impacts. Sea otter research is also an integral part of a collection of

projects proposed to address issues pertaining to nearshore vertebrate predators and ecosystem health. Funding is authorized for further project planning and development.

Sockeye Salmon

Recovery Status: Sockeye salmon in Red Lake, Akalura Lake, and lakes in the Kenai River system declined in population because of adult overescapement. The Red Lake system may be recovering because the plankton has recovered, and fry survival improved in 1993. However, Akalura Lake and Kenai River lakes have not recovered: smolt production has continued to decline from these lakes. In the Kenai River lakes, for example, smolt production has declined from 30 million in 1989 to 6 million in 1990, and to less than 1 million in 1992 and 1993.

Recovery Objective: Sockeye salmon in the impacted lakes will have recovered when populations are able to support overwinter survival rates and smolt outmigrations comparable to pre-spill levels.

FY 95 Work Plan Authorization:

95139	Wild Stock Supplementation Workshop	GR	$ 7.5 *
95255	Kenai River Sockeye Restoration	GR	502.7
95258	Sockeye Salmon Overescapement	M	793.4
95259	Restoration of Coghill Lake Sockeye	GR	273.6

* Will include planning efforts during FY 95 to comprehensively address issues concerning the effectiveness and biological implications of in-stream enhancement and other wild stock supplementation efforts.

Authorized projects include continued work on Kenai River sockeye to collect genetic stock information for use as a management tool; continued investigation of overescapement impacts on sockeye nursery lakes; and further fertilization efforts at Coghill Lake. Additionally, as a result of peer review of several proposed FY 95 projects that called for enhancement of wild fish stocks using in-stream restoration and/or hatchery supplementation a workshop (Project 95139) was authorized to comprehensively address issues concerning the effectiveness of these efforts as well as the biological implications to wild stocks prior to proceeding with these projects.

Subsistence

Recovery Status: Subsistence users say that maintaining their subsistence culture depends on uninterrupted use of subsistence resources. The more time users spend away from subsistence activities, the less likely they will return to the activities. Continuing injury to natural resources used for subsistence may affect the way of life of entire communities.

Recovery Objective: Subsistence will have recovered when injured subsistence resources are healthy and productive and exist at pre-spill levels and people are confident that the resources are safe to eat. One indication that recovery has occurred is when the cultural values provided by gathering, preparing, and sharing food are reintegrated into community life.

FY 95 Work Plan Authorization:

95009D	Survey and Experimental Enhancement of Octopuses in Intertidal Habitats	R	$ 125.0
95027	Kodiak Shoreline Assessment: Monitoring Surface and Subsurface Oil	M	447.8
95052	Community Interaction/Use of Traditional Knowledge	GR	152.0
95093	PWSAC: Restoration of Pink Salmon Resources and Services	GR	100.0 *
95127	Tatitlek Coho Salmon Release Program	GR	5.0 **
95131	Clam Restoration (Nanwalek, Pt Graham, Tatitlek)	GR	226.9
95138	Elders/Youth Conference	GR	76.4
95139	Wild Stock Supplementation Workshop	GR	7.5 *
95244	Seal and Sea Otter Cooperative Subsistence Harvest Assistance	GR	93.9
95266	Experimental Shoreline Oil Removal	GR	172.9
95272	Chenega Chinook Release Program	GR	47.2
95279	Subsistence Restoration -- Food Safety Testing	GR	180.6
95428-CLO	Closeout: Subsistence Planning	GR	99.9

* Will support planning during FY 95 to comprehensively address issues concerning the effectiveness and biological implications of in-stream enhancement and other wild stock supplementation efforts.
** Funding for NEPA compliance efforts only authorized.

Authorized FY 95 projects that would advance restoration of the subsistence service include several projects identified through the subsistence planning project initiated in FY 94. Authorized projects include continued work with subsistence users of harbor seals and sea otters; conclusion of a subsistence food safety testing program; continuation of the Chenega chinook release project initiated in FY 94; funding for NEPA compliance work concerning a proposed Tatitlek coho release project; a pilot project involving clam restoration (seed development) in the PWS area; a project to assess declines in octopus as a subsistence resource in PWS; a final Kodiak oiled shoreline assessment to be undertaken in consultation with subsistence users; a project to evaluate current techniques available to clean oiled shorelines; and initiation of an effort to more fully engage traditional subsistence users in research and monitoring efforts in order to take advantage of historical knowledge as well as better communicate restoration research findings. Another effort authorized in FY 95 with significance for subsistence users is the on-going review of possible wild stock supplementation proposals (see Projects 95139 and 95093). Although not specifically identified above, a large number of other restoration projects authorized for FY 95 that address other injured subsistence resources (e.g., restoration of harbor seals, herring and pink salmon) will also help restore subsistence services. That is,

all projects that aid the recovery of injured resources important to subsistence, or prevent further injuries to those resources as in the case of habitat protection efforts, will aid the recovery of subsistence.

Subtidal Organisms

Recovery Status: Certain subtidal organisms, like eelgrass and some species of algae, appear to be recovering. Other subtidal organisms, like leather stars and helmet crabs, show little signs of recovery.

Recovery Objective: Subtidal communities will have recovered when the community composition, age class distribution, population abundance of component species, and ecosystem functions and services in each injured subtidal habitat have returned to levels that would have prevailed in the absence of the oil spill.

FY 95 Work Plan Authorization:

95026	Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data	M	$ 146.9
95027	Kodiak Shoreline Assessment	M	447.8
95106	Subtidal Monitoring: Eelgrass Communities	M	200.4
95285-CLO	Closeout: Subtidal Sediment Recovery Monitoring	M	121.0

Authorized FY 95 projects include an integration of existing data as well as several monitoring efforts. During the FY 95 proposal peer review process, it became evident that there was a need for a focused workshop on issues pertaining to intertidal/subtidal restoration research and monitoring. This workshop will be conducted under the direction of the Chief Scientist during FY 95 to help guide future restoration efforts in this area.

MULTIPLE RESOURCE - SERVICE PROJECTS

In addition to the FY 95 Work Plan projects identified above, there are several projects authorized for FY 95 that would address a variety of resources or services simultaneously. These include:

- **administration, science management and public information** projects;
- **habitat protection and acquisition** projects;
- **seabird - forage fish interaction research** efforts;
- **PWS System Investigation** projects that address multiple resources;
- **pollution prevention projects** that would prevent further injury to marine resources as a means of promoting recovery;
- **improvements affiliated with the Institute of Marine Science at Seward** to provide needed research infrastructure that can be used for investigations to

address a variety of injured resources;
— **other, miscellaneous** resource or service proposals; and
— the **Restoration Reserve.**

Administration, Science Management and Public Information

FY 95 Work Plan Authorization:

95089	Information Management System	A	$ 522.8
95100	Administration, Science Management and Public Information	A	3,666.1
95199-CLO	Closeout: EIS for Institute of Marince Science - Seward	A	46.5
95422-CLO	Closeout: Restoration Plan EIS/Record of Decision	A	20.0

Authorized funding is required to prepare annual work plans, provide independent scientific review, oversee project budgets, solicit public involvement, and other administration, science management and public information efforts. The funding of $3.66 million for overall FY 95 Trustee Council program administration, science management and public information represents a substantial reduction in cost relative to the authorized FY 94 budget of $5.25 million. Authorized funding includes continuation of the Oil Spill Public Information Center (OSPIC) as well as an expanded information management effort for FY 95 that would integrate, synthesize and make more widely available Trustee Council sponsored research and restoration information. Also authorized are closeout projects for the Restoration Plan NEPA/EIS and the NEPA/EIS for facility improvements affiliated with the Institute of Marine Science at Seward.

Habitat Protection and Acquisition

FY 95 Work Plan Authorization:

95058	Restoration Assistance to Private Landowners	H	$ 115.8
95060	Spruce Bark Beetle Infestation Impacts on Injured Fish and Wildlife Species of the *Exxon Valdez* Oil Spill	H	26.8
95110-CLO	Closeout: Habitat Protection and Acquisition	H	144.0
95126	Habitat Protection and Acquisition Support	H	1,111.8
95126A	Carryforward: Habitat Protection - Acquisition Support	H	328.7
95505B	Data Analysis for Stream Habitat	H	17.2

Authorized projects for FY 95 include technical support for habitat protection and acquisition (e.g., site inspections, title searches, appraisals, parcel evaluations, etc.), as well as a new effort to provide technical assistance to private landowners who may wish to reduce impacts to injured resources resulting from on-going or proposed development; and data collection projects in support of habitat protection efforts.

Seabird - Forage Fish Interaction Research

Approximately a dozen projects were initially proposed for FY 95 that involved some aspect of forage fish as a prey resource and the implications for recovery of injured marine resources, especially sea birds. As a result of on-going review under the guidance of the Chief Scientist, these various individual research proposals are being developed and reformulated into a comprehensive, integrated seabird - forage fish interaction project. (Note: As a result of these on-going efforts, project numbers have changed since they were first published as part of the *Draft FY 95 Work Plan* in August 1994.)

FY 95 Work Plan Authorization:

95121	Fatty Acid Signatures of Selected Forage Fish Species in PWS	R	$ 30.0
95163A	Abundance/Distribution of Forage Fish and Influence on Recovery of Injured Species (former 95163) Forage Fish Species in PWS (former 95120-BAA)	R	194.8 *
95163F	Factors Affecting Recovery of PWS Pigeon Guillemots (formerly 95173)	R	55.1
95163I	Marine Bird-Forage Fish Interaction: Program Management and Integration	R	150.0 *

* Authorized funding would provide for continued planning regarding seabird - forage fish interactions.

Authorized FY 95 funding will allow continued development of the sea bird - forage fish interaction project effort. Additionally, a limited effort is authorized in FY 95 regarding fatty acid signatures of selected forage fish.

PWS System Investigation Research

As a multi-disciplinary, integrated research effort focused on trying to understand the natural and human factors that may be limiting the recovery of pink salmon and herring, the PWS System Investigation (Project 95320) includes approximately a dozen "core" sub-projects. Six of those sub-projects have implications for a wide variety of injured resources and services beyond the primary focus of pink salmon and herring.

FY 95 Work Plan Authorization:

95320G	Phytoplankton and Nutrients	R	$ 239.3
95320H	Role of Zooplankton in the PWS Ecosystem	R	247.4
95320I	Isotope Tracers - Food Webs Dependencies in PWS Using Stable Isotopes: Marine Mammals and Bird Relationships (former 95320I(1) and 95320I(2))	R	200.0
95320I(2)	Isotope Tracers - Food Webs of Fish	R	30.0 *
95320J	Information Systems and Model Development	R	836.2
95320K	PWSAC: Experimental Fry Release	R	47.3 **
95320M	Observational Physical Oceanography in PWS and the Gulf of Alaska	R	577.8

* Interim funding authorized for this project.
** Experimental release of fry as part of the PWS System Investigation research effort.

These authorized projects include oceanography research, investigations involving lower trophic level prey resources (phytoplankton, zooplankton), and broader scale food web relationships, as well as data synthesis, modeling and analysis across a range of research disciplines. See also discussion of pink salmon and Pacific herring.

Pollution Prevention

Two authorized projects, including one project that would carry forward funding initially authorized in FY 94, would help restore injured resources by allowing recovery to proceed without the added stress of marine pollution.

FY 95 Work Plan Authorization:

95115	Sound Waste Management Plan	GR	$ 284.5
95417	Carry-forward: Waste Oil Disposal Facilities	GR	232.2

Other Miscellaneous Projects

Miscellaneous projects that could benefit multiple injured resources or services include the three projects shown below.

FY 95 Work Plan Authorization:

95038	Symposium on Seabird Restoration	GR	$ 74.4
95052	Community Interaction and Use of Traditional Knowledge	GR	152.0
95290	Hydrocarbon Data Analysis, Interpretation and Database Maintenance for Restoration and NRDA Samples Associated with the *Exxon Valdez* Oil Spill	M	163.4

Research Infrastructure Improvements

FY 95 Work Plan Authorization:

95199-CLO	Institute of Marine Science Seward Improvements/EIS	A	$ 46.5
Resolution	Institute of Marine Science Seward Improvements	R	24,956.0 *

* See November 2, 1994 Trustee Council resolution (Appendix C).

Authorized projects for FY 95 include closeout of the NEPA/EIS for the research infrastructure improvements affiliated with the Institute of Marine Science in Seward. Additionally, the Trustee Council adopted a resolution (Appendix C) that conditionally authorized funding up to $24,956,000 for construction of the facilities.

Restoration Reserve

FY 95 Work Plan Authorization:

95424	Restoration Reserve	RR	$12,000.0

An additional allocation of $12 million to the Restoration Reserve was authorized to build the reserve to $24 million.

RESOLUTION
of the
Exxon Valdez Oil Spill Trustee Council

Research Infrastructure Improvements
affiliated with the
School of Fisheries and Ocean Sciences
Institute of Marine Science
in Seward, Alaska

WHEREAS, on January 31, 1994 the Trustee Council directed the Executive Director to prepare a formal recommendation concerning the proposed research infrastructure improvements affiliated with the Institute of Marine Science in Seward (hereafter, "the facility") and specifically indicated that the Executive Director should:

- take needed steps to secure compliance under the National Environmental Policy Act (NEPA);
- consult with appropriate entities, including the University of Alaska, the City of Seward, the Seward Association for the Advancement of Marine Science and Trustee Agencies to review the assumptions relating to the proposed improvements and capital and operating budgets;
- develop an integrated funding approach which assures that the use of trust funds is appropriate and legally permissible under the terms of the Memorandum of Agreement and Consent Decree; and
- prepare a recommendation of the appropriate level of funding for consideration by the Trustee Council that would be legally permissible under terms of the Memorandum of Agreement and Consent Decree; and

WHEREAS, since that time, the Trustee Council has been provided with detailed briefings and informational updates that address the issues identified in its January 31, 1994 directive to the Executive Director; and

WHEREAS, a detailed *Project Description and Supplemental Materials* document dated September 26, 1994 has been prepared (hereafter *Project Description*), the proposed project has been subjected to a full Environmental

Impact Statement (EIS) review under NEPA, and on behalf of the Trustee Council, the Department of the Interior has adopted a Record of Decision (ROD) for the EIS which has been concurred in by the federal trustee department and each of the State Trustees; and

WHEREAS, the *Executive Director's Recommendation and Findings Regarding Infrastructure Improvements Affiliated with the Institute of Marine Science in Seward, Alaska* has been prepared; and

WHEREAS, the Executive Director has reviewed the *Project Description* and, together with the Chief Scientist, finds that:

- the proposed facility improvements would provide needed research infrastructure for conducting long-term marine mammal, seabird, and fishery genetics research pertaining to species identified as injured by the oil spill in order to effectively restore those injured resources and that the facility has been designed to allow for adaptation to future restoration research needs;

- the capabilities of other coastal research facilities in Alaska have been assessed and that there are no existing facilities in Alaska to adequately address the identified and anticipated restoration research needs;

- the proposed research facility will make an important contribution to implementation of the ecosystem approach to restoration and that the facility would play a vital role in making it possible to understand the ecosystem relationships that may influence or control the recovery of injured resources;

- investment of settlement funds in the proposed research infrastructure would provide a needed facility for the Trustee Council restoration mission in a cost-efficient manner reflecting a reasonable balance between costs and benefits; and

WHEREAS, the Trustee Council's Public Advisory Group (PAG) has reviewed the *Project Description* and formally expressed its support for the facility at its October 13, 1994 meeting; and

WHEREAS, the Executive Director finds that a realistic construction plan for the proposed facility has been developed that will provide for the successful completion of the needed research facility within the budget identified (a copy of the capital budget from the *Project Description* is provided as an attachment);

THEREFORE BE IT RESOLVED, that the Trustee Council hereby concurs with and adopts the findings of the Executive Director and authorizes funding for

the project in an amount up to $24,956,000 to support development of the research components of the facility subject to the following provisions:

1. approval by the Executive Director of a detailed construction budget and a detailed operating plan that reflects a realistic cash flow for the successful construction and operation of the research facility;

2. approval by the Executive Director of an agreement to be entered into by the State of Alaska (Alaska Department of Fish and Game) and the City of Seward providing that the facility will be owned by the City and that the City will provide for the operation and maintenance of the facility for the practical life of the facility;

3. approval by the Executive Director of a showing by the City of Seward that future mitigation measures identified for the construction and operation of the facility will be given due consideration and implemented to the extent practicable;

4. approval by the Executive Director of a detailed governing and management structure for the facility that clearly identifies the role of the University of Alaska in providing the scientific leadership at the facility and ensures the facility is managed so that research activities appropriately serve the Trustee Council's restoration mission; and

5. annual financial reports and project status reports will be submitted to the Trustee Council by the City of Seward and the Executive Director will carefully monitor the construction of the facility and provide regular updates to the Trustee Council regarding the project's progress.

AND BE IT FURTHER RESOLVED, that it is the intent of the Trustee Council that funds for the project be transferred from the civil settlement to the Alaska Department of Fish and Game which shall, in turn, transfer capital funds to the City of Seward in a manner that is appropriate and timely to supplement the project funding previously appropriated by the Alaska State Legislature. Subject to the provisions identified above, the Alaska Department of Law and the Assistant Attorney General for the Environment and Natural Resources Division of the U.S. Department of Justice are hereby requested to petition the United States District Court for the District of Alaska for withdrawals in an amount of $12,500,000 on September 15, 1995 and an additional withdrawal of $12,456,000 on September 15, 1996 in accordance with the funding approvals contained herein.

AND BE IT FURTHER RESOLVED, that in authorizing funding for this project, the Trustee Council adopts the following policy: Consistent with this facility's unique capabilities for marine mammal, seabird and fishery genetics research, it is the policy of the Trustee Council to concentrate its EVOS-

funded laboratory research projects and resources at the IMS facility to the maximum extent practicable. Approval of individual laboratory research projects, including the facilities at which they will be located, will be based on the resources required for that project and its cost-effectiveness, including the cost-savings available to the Trustee Council at the IMS facility as a result of this capital investment.

Phil Janik, Regional Forester
Alaska Region
USDA - Forest Service

for Bruce Botelho, Attorney General
State of Alaska

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

John A. Sandor, Commissioner
Alaska Department of
Environmental Conservation

Steve Pennoyer, Director
Alaska Region
National Marine Fisheries Service

Carl L. Rosier, Commissioner
Alaska Department of Fish & Game

adopted November 2, 1994

Capital Budget

	CONSTR COST	DESIGN 15%	PA/PM 10%	CONT 10%	EIS/PLAN 2%	TOTAL
RESEARCH COMPONENT						
1. MAIN BUILDING	$9,815,000	$1,472,000	$981,000	$981,000	$196,000	$13,445,000
2. HABITAT	$8,204,000	$1,230,000	$820,000	$820,000	$164,000	$11,238,000
3. LIFE SUPPORT	$4,108,000	$616,000	$411,000	$411,000	$82,000	$5,628,000
4. SITE DEVELOPMENT	$2,319,000	$348,000	$232,000	$232,000	$47,000	$3,178,000
5. FF & EQUIPMENT	$2,560,000	$384,000	$256,000	$256,000	$51,000	$3,507,000
Subtotal	$27,006,000	$4,050,000	$2,700,000	$2,700,000	$540,000	$36,996,000
EDUCATION COMPONENT						
1. MAIN BUILDING	$5,713,000	$857,000	$571,000	$571,000	$114,000	$7,826,000
2. HABITAT	$1,017,000	$153,000	$102,000	$102,000	$20,000	$1,394,000
3. LIFE SUPPORT	$175,000	$26,000	$18,000	$18,000	$4,000	$241,000
4. SITE DEVELOPMENT	$420,000	$63,000	$42,000	$42,000	$8,000	$575,000
5. FF & EQUIPMENT	$309,000	$47,000	$31,000	$31,000	$6,000	$424,000
Subtotal	$7,634,000	$1,146,000	$764,000	$764,000	$152,000	$10,460,000
TOTAL PROJECT						
1. MAIN BUILDING	$15,528,000	$2,329,000	$1,553,000	$1,553,000	$310,000	$21,273,000
2. HABITAT	$9,221,000	$1,383,000	$922,000	$922,000	$184,000	$12,632,000
3. LIFE SUPPORT	$4,283,000	$643,000	$428,000	$428,000	$86,000	$5,868,000
4. SITE DEVELOPMENT	$2,739,000	$411,000	$274,000	$274,000	$55,000	$3,753,000
5. FF & EQUIPMENT	$2,869,000	$430,000	$287,000	$287,000	$57,000	$3,930,000
Total	$34,640,000	$5,196,000	$3,464,000	$3,464,000	$692,000	$47,456,000

Draft
Fiscal Year 1995 Work Plan

Supplement Volume I

Brief Project Descriptions

Prepared by:

***Exxon Valdez* Oil Spill Trustee Council**

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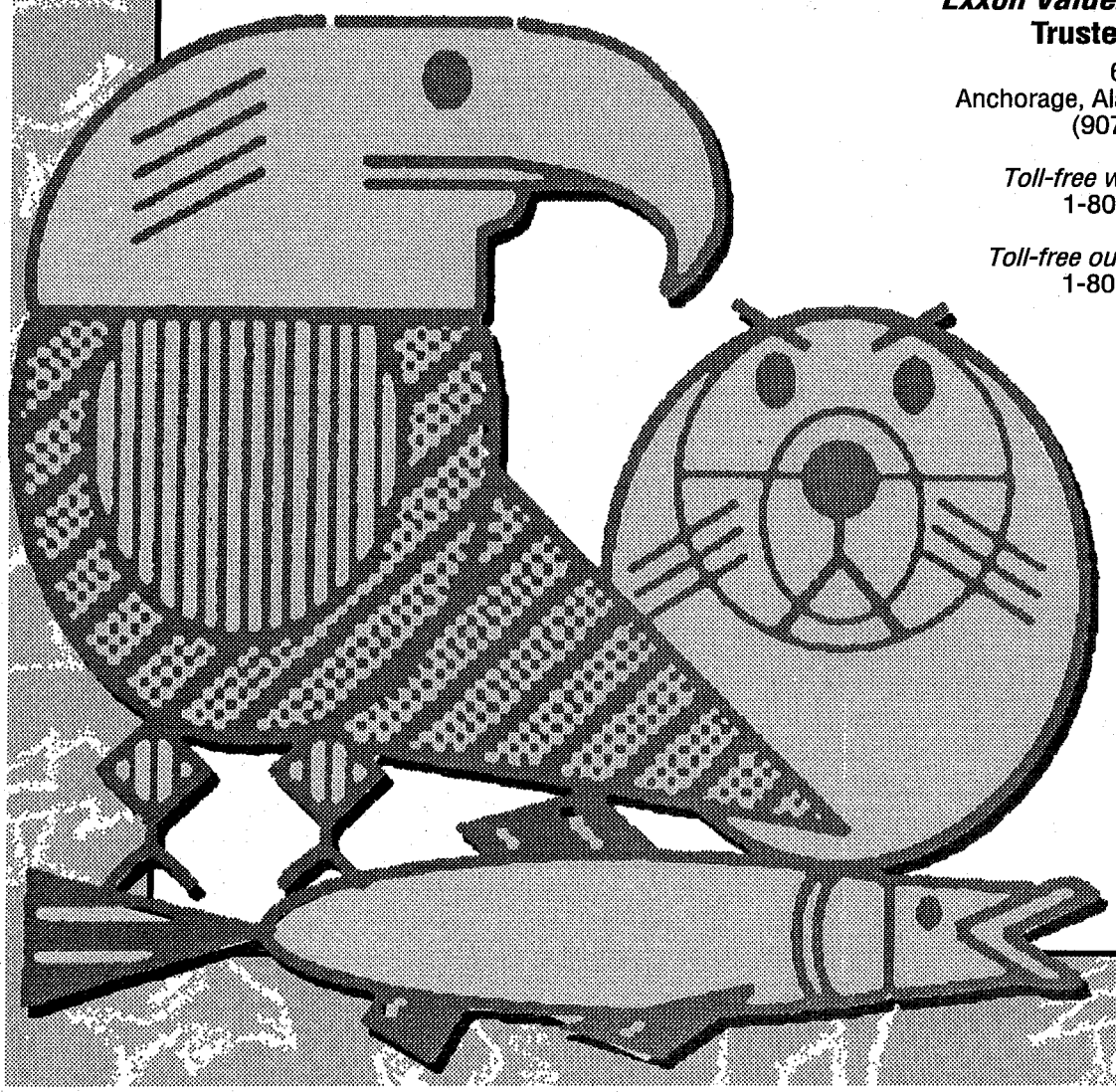

August 1994

The *Exxon Valdez* Oil Spill Trustee Council and the State and Federal Trustee Agencies conduct all programs and activities free from discrimination on the basis of sex, color, race, religion, national origin, age, marital status, pregnancy, parenthood, or disability. For information on alternative formats available for this and other publications, please contact the Public Information Office at (voice) 907 278-8012 or (fax) 907 276-7178. Any person who believes s/he has been discriminated against should write to: ADEC, 410 Willoughby Avenue, Suite 105, Juneau, AK 99801, or O.E.O., U.S. Department of the Interior, Washington, D.C. 20240.

This publication was released by the *Exxon Valdez* Oil Spill Trustee Council and produced at a cost of $17.30 per copy. This document provides a report of the proposed activities of the Council. It was printed in Juneau, Alaska.

Draft
Fiscal Year 1995 Work Plan

Supplement Volume I

Prepared for:
***Exxon Valdez* Oil Spill**
Trustee Council

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Alaska Department of Fish & Game

JOHN A. SANDOR
Commissioner
Alaska Department of Environmental Conservation

August 1994

Dear Reviewer:

This document, *Draft Fiscal Year 1995 Work Plan - Supplement Volume I*, contains brief project descriptions of 93 project proposals submitted to the *Exxon Valdez* Oil Spill Trustee Council for funding in Fiscal Year 1995. These 93 projects are those which, after preliminary review, have been assigned to Evaluation Category 1 and Evaluation Category 2.

Projects assigned to Evaluation Category 1 are those that appear to have high restoration benefit and strong technical merit. Projects assigned to Evaluation Category 2 are those that appear to be permissible under the terms of the court-approved civil settlement, but are of a lower priority for funding in FY 95. The preliminary review and categorization were conducted by the Trustee Council's Executive Director, with the assistance of the Chief Scientist, independent peer review scientists, and agency staff. Proposals were reviewed for scientific and technical merit, potential restoration benefit, and legal and policy considerations. The identification of a project in a particular category does not reflect an action or decision on the part of the Trustee Council regarding any specific project or proposal to be funded in FY 95.

Descriptions of projects identified as Evaluation Category 3 (those that lack a clear relationship to restoration or are otherwise of low priority), Category 4 (those with significant legal or policy issues), Category 5 (those that fund only data analysis and report writing efforts associated with 1994 projects), and Category 6 (those that complete projects begun in 1994) are contained in *Draft Fiscal Year 1995 Work Plan - Supplement Volume II.* Budget information for all projects is contained in *Draft Fiscal Year 1995 Work Plan - Supplement Volume III.* Volumes II and III are available for review at the *Exxon Valdez* Restoration Office (see address below), and at libraries and Legislative Information Offices throughout the spill area. Copies of individual project descriptions or budgets may be requested by calling the Restoration Office (see numbers below).

In a number of instances, Category 1 and 2 projects were submitted as multi-project, integrated efforts. These include (1) the Prince William Sound System Investigation, a multi-year research effort to determine what natural and spill-related factors are affecting the health and population of Prince William Sound pink salmon and herring; (2) the Marine Mammal Ecosystem Study, a study of the long-term decline in some marine mammals and seabirds; and (3) the Nearshore Vertebrate Predator Study, which focuses on the status of top-level predators that feed in the nearshore environment. "Overview" documents describing each of these integrated efforts are available from the Restoration Office.

A complete discussion of the Trustee Council's restoration efforts, including the project proposal and evaluation process, is contained in the *Draft Fiscal Year 1995 Work Plan - Summary.* Copies of the summary, as well as additional copies of this *Supplement Volume I* are available from the Restoration Office.

Exxon Valdez Oil Spill Trustee Council Restoration Office
645 G Street
Anchorage, Alaska 99501
Telephone (907) 278-8012 (toll-free within Alaska at 1-800-478-7745;
from outside Alaska at 1-800-283-7745)

Project descriptions contained in the *Draft Fiscal Year 1995 Work Plan - Supplement Volume 1* appear in numerical order. Each project description contains the following information:

Project Number: A numerical coding assigned for tracking purposes.

Restoration Category: The means by which a project would achieve restoration goals. The restoration categories are research; monitoring; general restoration; habitat protection and acquisition; administration, public information and science management; and restoration reserve.

Proposed By: The organization or individual that submitted the project.

Lead Trustee Agency: For projects not submitted by one of the six Trustee Agencies, the agency that has been assigned administrative responsibility for the project. The six Trustee Agencies are the Alaska Department of Environmental Conservation (ADEC), the Alaska Department of Fish and Game (ADFG), the Alaska Department of Natural Resources (ADNR), the U.S. Department of Interior (DOI), the U.S. Forest Service (USFS), and the National Oceanic and Atmospheric Administration (NOAA).

Cooperating Agencies: Trustee Agencies, other than the Lead Trustee Agency, that would participate in implementation and management of the project.

Cost FY 95: The amount of money being requested for the project in federal fiscal year 1995 (October 1, 1994 - September 30, 1995).

Cost FY 96: The amount of money that will be requested for the project in federal fiscal year 1996 (October 1, 1995 - September 30, 1996).

Total Cost: The total amount of money, if known, that will be requested to bring the project to completion.

Duration: The total number of fiscal years, if known, for which money will be requested for the project.

Geographic Area: The geographic area in which the field work on the project will take place.

Injured Resource/Service: The resource or service injured by the spill that the project is designed to restore.

The Trustee Council is asking for your comments to help make decisions about the *Draft Fiscal Year 1995 Work Plan*. To use your comments, they must be **postmarked by October 3, 1994.**

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 1 and 2 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95001	Condition and Health of Harbor Seals	Castellini, UAF	Research	$172.8	1
95005	Harlequin Duck Abundance and Productivity in Western Cook Inlet	DOI	Monitoring	$40.5	2
95007A	Archaeological Site Restoration - Index Site Monitoring	ADNR	Monitoring	$386.3	1
95007B	Archaeological Site Restoration	USFS	General Restoration	$116.0	1
95009C	Trophic Dynamics and Energy Flow: Impacts of Herring Spawn and Sea Otter Predation on Nearshore Benthic Community Structure	Highsmith, UAF	Research	$217.3	2
95009D	Survey and Experimental Enhancement of Octopuses in Intertidal Habitats	Scheel, PWS Science Center	Research	$188.9	1
95013	Killer Whale Monitoring in PWS	Matkin, North Gulf Oceanic Society	Monitoring	$113.7	1
95014	Predation by Killer Whales in PWS: Feeding Behavior and Distribution of Predators and Prey	Matkin, North Gulf Oceanic Society	Research	$177.6	1
95018	Partitioning of Primary Production Between Pelagic and Benthic Communities	Naidu, UAF	Research	$219.2	2
95019	Distribution and Abundance of Forage Fish as Indicated by Puffin Diet Sampling	DOI	Research	$271.3	1
95021	Seasonal Movement and Pelagic Habitat Use by Common Murres from the Barren Islands	DOI	Research	$230.9	2
95023	Food Web Relationships of Pelagic Species Exhibiting Long-term Decline	Duffy, Alaska Natural Heritage Program	Research	$133.2	2
95024	Enhancement of Wild Pink Salmon Stocks	Reidel, Native Village of Eyak	General Restoration	$184.0	2
95025A	Factors Affecting Recovery of Sea Ducks and Their Prey	DOI	Research	$415.1	1

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 1 and 2 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95025B	Sea Otter Abundance and Distribution, Food Habits and Population Assessment	DOI	Research	$168.1	1
95025C	Pigeon Guillemots and River Otters as Bioindicators of Nearshore Ecosystem Health	Roby, UAF	Research	$189.2	1
95025E	Algal Competition Limiting Recovery in the Intertidal	Stekoll, UAF	Research	$205.1	2
95025F	Availability and Utilization of *Musculus* spp. as Food for Sea Ducks and Sea Otters	Dean, Coastal Resources Associates, Inc.	Research	$5.5	2
95025H	Effects of Predatory Invertebrates on Nearshore Clam Populations in PWS	Van Blaricom, NBS	Research	$123.4	1
95026	Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data	ADEC, Institute of Arctic Biology, UAF	Monitoring	$146.9	1
95027	Kodiak Shoreline Assessment: Monitoring Surface and Subsurface Oil	ADEC	Monitoring	$447.8	2
95029	Population Survey of Bald Eagles in PWS	DOI	Monitoring	$48.7	2
95030	Productivity Survey of Bald Eagles in PWS	DOI	Monitoring	$81.9	1
95031	Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS	DOI	Research	$444.8	1
95033	Kittiwakes as Indicators of Forage Fish Availability	DOI	Research	$198.5	1
95038	Symposium on Seabird Restoration	Harrison, Pacific Seabird Group	General Restoration	$74.4	2
95039	Common Murre Productivity Monitoring	DOI	Monitoring	$154.2	1
95041	Introduced Predator Removal from Islands - Follow-up Surveys	DOI	General Restoration	$66.5	1
95044	*In Situ* Formation and Ecotoxicity of Hydrocarbon Degradation Products Produced by Ultramicrobacteria	Button, UAF	Research	$135.1	1

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 1 and 2 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95048	Historical Analysis of Sockeye Salmon Growth	Ruggerone, Natural Resources Consultants	Monitoring	$99.2	1
95051	Large-scale Coded Wire Tagging of PWS Herring	June, Natural Resources Consultants	General Restoration	$231.9	1
95052	Community Involvement and Use of Traditional Knowledge	ADNR	General Restoration	$230.5	1
95057	Movement of Larval and Juvenile Fishes within PWS	Norcross, UAF	Research	$328.1	2
95058	Restoration Assistance to Private Landowners	USFS	Habitat Protection	$423.7	2
95062	River Otter Recovery Monitoring	ADFG	Monitoring	$55.9	2
95064	Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in PWS	ADFG	Research	$347.1	1
95069	Restoration of Salmon Stocks of Special Importance to Native Cultures	ADFG	General Restoration	$665.7	2
95074	Herring Reproductive Impairment	NOAA	Research	$407.2	1
95075	Population Structure of Blue Mussels in Relation to Levels of Oiling and Densities of Vertebrate Predators	NOAA	Research	$197.5	2
95076	Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon	NOAA	Research	$179.9	1
95086A	Coastal Habitat Intertidal Monitoring and Experimental Design Verification	Stekoll, UAF	Monitoring	$892.6	1
95086C	Herring Bay Monitoring and Restoration Studies	Highsmith, UAF	Research	$904.2	1
95087	Relation of Sea Urchin Population Structure to Recovery of Injured Nearshore Vertebrate Predators	Jewett, UAF	Research	$48.8	1

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 1 and 2 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95089	Information Management System	Executive Director's Office	Administration and Public Information	$590.7	1
95090	Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska	NOAA, ADEC	Monitoring	$438.8	1
95092	Recovery Monitoring of PWS Killer Whales	NOAA	Monitoring	$110.0	1
95100	Administration, Science Management and Public Information	Executive Director's Office	Administration and Public Information	$3,596.9	1
95105	Kenai River Ecosystem Restoration Pilot Enclosure Study	ADFG	General Restoration	$404.8	1
95106	Subtidal Monitoring: Eelgrass Communities	Jewett, UAF	Monitoring	$200.4	1
95115	Sound Waste Management Plan	PWS Economic Development Council	General Restoration	$352.2	1
95117-BAA	Harbor Seals and EVOS: Blubber and Lipids as Indices of Food Limitation	Castellini, UAF	Research	$94.4	1
95118-BAA	Diet Composition, Reproductive Energetics and Productivity of Seabirds Damaged by the *Exxon Valdez* Oil Spill	Roby, UAF	Research	$140.6	1
95120-BAA	Proximate Composition and Energetic Content of Selected Forage Fish Species in PWS	Worthy, Texas A&M University	Research	$43.0	1
95121	Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish Species in PWS	Worthy, Texas A&M University	Research	$48.1	2
95126	Habitat Protection and Acquisition Support	ADNR	Habitat Protection	$1,099.5	1
95131	Clam Restoration (Nanwalek, Port Graham, Tatitlek)	Nanwalek and Port Graham Village Councils	General Restoration	$445.0	1

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 1 and 2 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95132	Port Graham and Nanwalek Subsistence Baseline	Port Graham Village Council, Nanwalek Village Council	General Restoration	$518.7	2
95133	English Bay River Sockeye Salmon Subsistence Project	Kvasnikoff, Nanwalek Traditional Council	General Restoration	$147.2	2
95137	Prince William Sound Salmon Stock Identification and Monitoring Studies	ADFG	General Restoration	$277.5	1
95138	Elders/Youth Conference	Fall, Subsistence Division	General Restoration	$85.8	1
95139A	Spawning Channel - Port Dick Creek	ADFG	General Restoration	$33.2	2
95139C	Montague Riparian Rehabilitation	USFS	Habitat Protection	$46.2	2
95159	Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in PWS	DOI	Monitoring	$426.8	2
95163	Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species	NOAA	Research	$1,294.6	1
95166	Herring Natal Habitats	ADFG	Monitoring	$512.8	1
95173	Factors Affecting Recovery of PWS Pigeon Guillemot Populations	DOI	Research	$408.8	1
95191A	Investigating and Monitoring Oil Related Egg and Alevin Mortalities	ADFG	Research	$265.0	1
95191B	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)	NOAA	Research	$331.0	1
95244	Seal and Sea Otter Cooperative Subsistence Harvest Assistance	ADFG	General Restoration	$89.9	1
95255	Kenai River Sockeye Restoration	ADFG	General Restoration	$645.0	1
95258	Sockeye Salmon Overescapement	ADFG	Monitoring	$998.1	1

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 1 and 2 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95266	Shoreline Assessment and Oil Removal	ALL	General Restoration	$1,411.1	2
95272	Chenega Chinook Release Program	Olsen, PWS Aquaculture Corporation	General Restoration	$47.2	1
95279	Subsistence Restoration Project	ADFG	General Restoration	$241.6	2
95290	Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the *Exxon Valdez* Oil Spill	NOAA	Monitoring	$163.4	1
95320A	Salmon Growth and Mortality	ADFG	Research	$267.8	1
95320D	PWS Pink Salmon Genetics	ADFG	General Restoration	$227.0	2
95320E	Juvenile Salmon and Herring Integration	ADFG	Research	$943.1	1
95320G	Phytoplankton and Nutrients	McRoy, UAF	Research	$239.3	1
95320H	Role of Zooplankton in the PWS Ecosystem	Cooney, UAF	Research	$247.4	1
95320I(1)	Isotope Tracers - Food Web Dependencies in PWS Using Stable Isotopes (Marine Mammals and Birds)	Schell, Institute of Marine Science	Research	$115.4	1
95320I(2)	Isotope Tracers - Food Webs of Fish	Kline, UAF	Research	$79.4	1
95320J	Information Systems and Model Development	Patrick, PWS Science Center	Research	$836.2	1
95320M	Observational Physical Oceanography in PWS and the Gulf of Alaska	Salmon, PWS Science Center	Research	$577.8	1
95320N	Nearshore Fish	Thomas, PWS Science Center	Research	$635.2	1
95320Q	Avian Predation on Herring Spawn	USFS	Research	$99.0	1

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 1 and 2 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95320S	Disease Impacts on PWS Herring Populations (competitive solicitation under State of Alaska two-step, RFQ-RFP process)	ADFG	Research	$379.9	1
95320T	Juvenile Herring Growth and Habitat Partitioning	ADFG	Research	$340.3	1
95320U	Somatic and Spawning Energetics of Herring and Pollock	Paul, UAF	Research	$99.4	1
95320Y	Variation in Local Predation Rates on Hatchery-Released Fry	Scheel, PWS Science Center	Research	$161.2	1
95424	Restoration Reserve	ALL	Restoration Reserve	$12,000.0	1
95427	Harlequin Duck Recovery Monitoring	ADFG	Monitoring	$226.9	1
95505B	Data Analysis for Stream Habitat	USFS	Habitat Protection	$17.2	1

DRAFT FISCAL YEAR 1995 WORK PLAN
PROJECT DESCRIPTIONS

(EVALUATION CATEGORY 1 & 2 PROJECTS)

Recovery of Harbor Seals from EVOS: Condition and Health Status

Project Number:	95001
Restoration Category:	Research (new)
Proposed By:	University of Alaska, Fairbanks
Lead Trustee Agency:	ADFG
Cost FY 95:	$172,800
Cost FY 96:	$135,900
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Harbor seal

INTRODUCTION

This proposal is written in collaboration with the inter-disciplinary and integrative marine mammal ecosystems program submission to EVOS. As outlined under the broad program direction, the goals of the combined collaborative projects are to investigate ecosystem wide questions addressing the recovery of marine mammal injured species, specifically, harbor seals. These issues include the direct impact of oil spills, human interactions, food, competition, climatic factors, disease and habitat loss. Under these guidelines, the enclosed proposal deals with the issues of body condition and health status of harbor seals with the resulting data applying directly to issues of disease, food limitation and the impact of oil.

In collaboration with other field teams, 30-40 harbor seals will be captured and temporarily held at sampling sites within and outside the EVOS area. Complete body morphometrics (to assess body condition) and samples of blood (to examine disease/health status) will be collected. Seals will be returned unharmed to the capture site and blood samples will be taken to the University of Alaska in Fairbanks for analysis.

Body Morphometrics. Using a large temporal and geographic data base currently held at UAF, the body morphometrics of the harbor seals will be analyzed and fit to models of body condition. For example, we have excellent data relating the length and girth of seals to their body mass. By fitting harbor seals to these curves, we can assess whether the animals are underweight (malnourished) or "normal". Additional factors, such as estimates of total body fat and body density are included in these assessments of condition. It is proposed that by comparing values for body condition from harbor seals collected before and after the EVOS event and by comparing data collected from animals inside and outside of the EVOS area, we can provide information as to whether this species, which is not recovering, appears to be physically sound.

Blood Chemistry: Samples of blood will be analyzed for over 30 indicators of "health". These tests will examine, among others, potential anemia, dehydration, organ function, tissue damage and oxygen carrying capacity. In addition, assays for hormonal balance and stress protein levels that are extremely sensitive to alterations in health status will be conducted. These data will be compared, on a temporal basis with samples collected before EVOS and on a geographic basis with control animals that were not impacted.

NEED FOR THE PROJECT

As a component of the marine mammal ecosystems proposal, this project deals with the health status/disease/body condition segment of harbor seal biology. To move towards the restoration of marine mammals, a multi-disciplinary, integrative approach is critical given the scope of the problem. Thus, certain components of the marine mammal ecosystems group will focus on habitat use and trophic level interactions, others on population studies and others on food resources. Any one agency cannot handle all components of such an intense approach. The University can provide the services and research for the health component through the Institute of Marine Science marine mammal physiology group. To move towards restoration, interactive projects, such as the one proposed here, must be carried out in collaboration with monitoring programs. That is, limited field programs that only contained a monitoring component or conversely only looked at individual animals would not be the most appropriate way to understand the impact of the EVOS event on injured species.

The premises and hypotheses of this project are simple: Either the EVOS impacted animals are different in their health status compared to non-EVOS animals, or they are not. If the species are compromised, then we will know some of the directions that would have to be followed towards potential restoration. If they are not compromised, then we will be able to focus our attention into other areas that may better explain their current recovery status.

PROJECT DESIGN

A. Objectives

1. Capture 30-40 harbor seals at locations throughout PWS at 2-3 different times per year. This work will be in direct field collaboration with ADFG.

2. Hold animals for 1-4 hours during which time complete body measurements and blood samples will be collected.

3. Analyze body measurements via computer modeling and assay blood samples for health indicators.

B. Methods

Captures: This will involve procedures tested in the field and routinely utilized by ADFG. Basically, the seals are approached from sea on small boats while the animals are hauled out on beaches. A net is set across the beach and the animals move from the beach into to water when they see the boats. Animals are caught in the nets, moved onto the beach, tranquilized to facilitate the measurements and held until all sampling, attachment of diving recorders and recovery from anaesthesia are completed.

Body measurements: Linear and curvilinear length, girth at 7 locations and mass are collected from each animal. These are quickly and easily carried out in the field. Back at UAF, the data are fit into models of how length, girth and mass are related for harbor seals and animals are quickly placed above or below their predicted weight for size. In addition, estimates of total body fat will be collected from measurements of total body impedance (BIA). This method utilizes a quick assessment of body fat by measuring resistance across a set of electrodes placed at the head and tail of the body. Further estimates of body fat are taken from ultrasound measurements of blubber depth at half a dozen sites across the body. From all of these values, estimates of body density (i.e., relative fatness) can be evaluated.

Blood chemistry: Blood samples are measured in the field to assess the number of red cells in the blood (hematocrit), visualized under microscopes to examine the types of blood cells and then prepared for return to the lab. At Fairbanks, the samples are sent to a veterinary laboratory for assessment of "standard" health indices (such as cholesterol level, salts, and enzymes characteristic of tissue damage) and also analyzed at UAF for indicators of dehydration (water content), malnutrition (BUN, ketones), stress (haptoglobin), hormone imbalance (Angiotensin, ANP) and stress proteins (samples sent to collaborators at Stanford Research Institute). These data can then be compared to cataloged values for healthy seals to assess the status of the PWS seals.

It should be emphasized that the above methods are routine for the marine mammal group at UAF and that we conduct similar assays hundreds of times/year on seal and sea lion species from around the world. Thus, we have the expertise, the data bases and the consistency to best analyze these samples from the PWS animals.

C. Schedule

Capture dates: It is anticipated that captures of harbor seals will occur in the spring (April), summer (July) and fall (October) for both calendar years 1995 and 1996.

Analysis dates: Blood samples will be analyzed after each capture. Some of the assays are rapid and can be done within days for all samples, others take much longer. Body morphometric analysis is rapid and animals can be quickly assessed.

Report dates: The last predicted field season will be in the fall of 1996 and the final section of support will be to allow completion of analyses and publish reports. A final report will be submitted on 12/31/97.

D. Technical Support

Veterinary samples will be sent on a service agreement to veterinary facilities in Fairbanks. Stress protein samples will be sent to Stanford Research Institute for analysis. All other analytical processes will be carried out by UAF personnel. Boat and direct field support will be through our ongoing collaboration with ADFG.

E. Location

Harbor seals will be captured in the EVOS event area in central and southwest PWS.

PROJECT IMPLEMENTATION AND COORDINATION OF INTEGRATED RESEARCH EFFORT

As noted above, this project on the health of harbor seals, is submitted jointly as part of the marine mammal ecosystems program. This component is being run by the marine mammal physiology group at UAF. Other state agencies, federal agencies and universities will be in charge of other components of the project. UAF, ADFG and NOAA currently collaborate with each other on marine mammal biology projects in and around Alaska. This project expands and builds on that collaboration and extends the depth of the project to focus on the EVOS event.

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	153.0
Commodities	0.0
Equipment	0.0
Subtotal	161.0
Gen. Admin.	11.8
Total	172.8

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Harlequin Duck Abundance and Productivity in Western Lower Cook Inlet

Project Number:	95005
Restoration Category:	Monitoring (new)
Proposed By:	DOI
Cost FY 95:	$40,500
Cost FY 96:	$42,000
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Western Lower Cook Inlet from Redoubt Point to Sea Otter Point, including Tuxedni and Chinitna Bay
Injured Resource/Service:	Harlequin duck

INTRODUCTION

The purpose of this project is to establish baseline population parameters for harlequin ducks (*Histrionicus histrionicus*) in Western Lower Cook Inlet. This project will provide information on harlequin duck distribution, abundance, productivity, and habitat use that will assist in restoring harlequin duck populations in the Gulf of Alaska.

NEED FOR THE PROJECT

There is no existing information concerning harlequin ducks in Western Cook Inlet. Random observations made during routine coastal patrols and reconnaissance surveys following the 1989 *Exxon Valdez* oil spill suggest that this region supports a substantial breeding population of harlequin ducks. Although the project site occurs within the *Exxon Valdez* Spill Area, it has been assumed that harlequin duck populations and habitat were not impacted.

Knowledge of breeding harlequin duck numbers and reproductive performance on the northwestern edge of the spill zone will provide a useful reference against which recovery rates in Western Prince William Sound can be measured. Full restoration of this species may require knowledge of how populations are performing in undisturbed breeding habitats.

In addition, results of this project can be used to direct management actions that protect or maintain harlequin duck populations within Western Lower Cook Inlet. Some coastal and riparian habitats within this region could be adversely impacted by logging, mining and residential development on private inholdings. Information on harlequin duck distribution and habitat requirements is necessary to guide land acquisition or protection efforts within riparian corridors.

PROJECT DESIGN

A. Objectives

Determine distribution, abundance, productivity, and habitat use of harlequin ducks (population parameters will be expressed as breeding adults and juveniles/linear mile of coastline).

B. Methods

Numbers of adult harlequin ducks will be estimated bi-weekly from 1 May to 15 June in tidal estuaries and coastal waters before they ascend the rivers to breed. From 15 July to 30 September bi-weekly surveys for adults and broods will be used to measure production. Population/production surveys will systematically sample coastal and intertidal habitats between Redoubt Point and Sea Otter Point, and large near-coastal lakes such as Crescent and Hickerson. Coastal harlequin population/production surveys will be conducted from a 22 foot aluminum skiff powered by twin 50 hp outboards. A skiff operator will pilot the vessel near the coastline, islands and off-shore rocks, and in intertidal estuaries. One or more observers will use 8-10X binoculars to determine numbers, sex, and age of all birds sighted. Habitat descriptions of breeding streams, including vegetative, hydrologic, and topographic characteristics as described by Patten, will be made from 1:12,000 scale aerial photographs obtained in 1993 and selective ground surveys.

C. Schedule

Early (May-June) and late summer (July-September) surveys will be used to measure reproductive effort and performance of resident harlequin ducks. Habitat descriptions will be made during July and August. Data analysis and report preparation will be completed in November.

D. Technical Support

Computer services and other technical support will be provided by Lake Clark National Park.

E. Location

The project will include near-coastal waters, rivers and lakes between Redoubt Point and Sea Otter Point in Western Lower Cook Inlet. No communities will be affected by the project.

PROJECT IMPLEMENTATION

The Lake Clark National Park field headquarters at Port Alsworth would implement 100% of the this project. Park biologists have the technical expertise and logistical support to conduct this project in the most timely and cost-effective fashion. Local knowledge of the coastline, field work conditions, and the seasonal use patterns of harlequin ducks is pivotal to the success of the project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The Alaska Department of Fish and Game, Division of Wildlife Conservation and U.S. Fish and Wildlife Service will collaborate in this project. Survey dates and procedures will conform to those used by the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game to assure direct comparison of results with other study sites. Because site-specific variations may occur in the chronology of harlequin breeding, survey dates in this project span a broader period than those used in Prince William Sound.

FY 95 BUDGET ($K)

Personnel	12.0
Travel	8.5
Contractual	13.0
Commodities	2.0
Equipment	2.0
Subtotal	37.5
Gen. Admin.	3.0
Total	40.5

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Archaeological Site Restoration -- Index Monitoring

Project Number:	95007A
Restoration Category:	Monitoring (continuation of 94007)
Proposed By:	DNR
Cooperating Agencies:	USFS, DOI
Cost FY 95:	$386,300 (includes $191,700 for data analysis and report writing of FY 94 work)
Cost FY 96:	$193,200
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Oil spill area
Injured Resource/Service:	Archaeological resources

INTRODUCTION

Damage to archaeological sites as a result of cleanup activities after the *Exxon Valdez* Oil Spill has been amply documented in damage assessment studies performed since the spill. Sites vandalized since the spill have been monitored and plans developed to restore the damages at the studied sites. Monitoring of damaged sites as a gauge of vandal activities in the spill area was identified as a primary strategy for site restoration during fiscal year 1995 (FY95). The monitoring will continue and extend beyond the documentation of vandalized sites investigated under project 94007, Site Specific Archaeological Restoration

Closeout of local community interviews to compile local preservation plans and needs plus report completion for Project 94007 will be a component of Project 95007A.

NEED FOR THE PROJECT

Evidence of vandalism dropped dramatically after 1989, probably reflecting the more effective archaeological constraint system that had been put into place by the participating agencies, with the cooperation of Exxon Corp., by the late summer of 1989. This apparent reduction in vandalism was unexpected and at first suggested that continued vandalism related to the *Exxon Valdez* spill event might not be a significant future concern. However, based on what we know

about the behavior patterns of archaeological looters, the activity focus of vandals may have shifted (or will shift) from general prospecting to a more focused pattern during the initial "prospecting" phase, or simply observed by more discrete potential looters engaged in cleanup operations in the post-1989 era. Artifact hunters are most likely to act on the opportunities presented by this knowledge in the next 15 years while their memories remain fresh; thereafter, the threat should gradually drop as the information loses "immediacy" and specificity.

Local communities have identified repeatedly the need for a program to preserve the injured heritage of the people and a coordinated plan to accomplish that goal is the aim of the closeout for 94007.

PROJECT DESIGN

A. Objectives

Archaeological monitoring of archaeological sites injured by the spill or spill related activities will target a small number of sites which are determined to represent those that are most vulnerable to looting. Those sites will serve as a gauge for levels of vandalism in the spill area. Compilation of local heritage preservation needs into one coordinated plan are a closeout objective for 94007.

B. Methods

A strategy was identified during a 1994 restoration workshop of designating 3 or 4 index sites or sites critically vulnerable to looting which will be monitored on an annual basis. A second group of 4 sites will be selected for monitoring biannually as a check over a broader area. The second group of sites may vary over time in order to maintain flexible response to new information such as fresh reports of vandalism or new findings on patterns of looting. The second group of sites provides a cross-check to monitoring data collected at the index sites. Focusing annual monitoring on 4 index sites and using a 2-year monitoring schedule on the additional 4 sites, expenditures will be significantly reduced while maintaining continuity of tracking levels of vandalism over the years. Vulnerability to looting will be the primary criteria of selection with managerial jurisdiction a secondary concern. One or two of these sites will also be selected for continued hydrocarbon monitoring so the behavior and effect of oiling can be observed over the long term in archaeological deposits. The closeout plan for FY94 data will consider federal, state and private programs in a single document.

C. Schedule

Project proposal reviewed in Public Review Document	August, 1994
Trustee Project Approval	November, 1994
Completion of interviews in local communities	November, 1994
Submittal of draft heritage plan for local comment	January, 1995
Detailed Work Plans submitted	January 1, 1995
Final Heritage Plan	May, 1995
Fieldwork	May-August, 1995
Draft Report	October 1, 1995
Final Report	January 1, 1996

D. Technical Support

The only technical support will be provided by commercial radiocarbon laboratory and a lab capable of conducting the required chemical testing.

E. Location

The sites will be located throughout the spill area.

PROJECT IMPLEMENTATION

This project will be implemented by agency archaeologists meeting the professional qualifications specified under the Secretary of the Interior's Guidelines for Archaeology and Historic Preservation.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be coordinated with the Traditional Knowledge Transfer Project proposed for Trustee funding in FY95. It will not mesh well with other projects although logistic arrangements will be coordinated with projects within each agency.

FY 95 BUDGET ($K)

	FY 94 Report*	FY 95 Work**	Total FY95 Budget
Personnel	80.7	97.5	178.2
Travel	1.5	38.0	39.5
Contractual	90.1	34.1	124.2
Commodities	1.0	7.8	8.8
Equipment	0.0	0.0	0.0
Subtotal	173.3	177.4	350.7
Gen. Admin.	18.4	17.0	35.4
Total	191.7	194.4	386.1

* Includes Site Specific Restoration Report and Community Protection Plan
** Includes Index Sites Monitoring

Site SEW-488 Archaeological Site Restoration

Project Number:	95007B
Restoration Category:	General Restoration (continuation of 94007)
Proposed By:	USFS
Lead Trustee Agency:	ADNR
Cooperating Agencies:	USFS
Cost FY 95:	$116,000
Cost FY 96:	$16,100
Total Cost:	$132,100
Duration:	2 years
Geographic Area:	Knight Island, Prince William Sound
Injured Resource/Service:	Archaeological resources

INTRODUCTION

The Louis Bay Lamp Site, SEW-488, was discovered during the *Exxon Valdez* Oil Spill Cleanup Program. This site has yielded dates for human occupation ranging from 600 BP to 3,400 BP. Injury to the site consists of oiling during high pressure water treatment and unmonitored cleanup activities. Although this project was funded in FY94, objections to the work by one of the interested parties has halted current field efforts.

NEED FOR THE PROJECT

Preliminary testing indicates the site has the potential to reveal an extensive sequence of occupational layers interspersed by beach deposits. This project will enhance the scientific and cultural understanding of early occupants of the Sound as well as ensure the preservation of the site for further investigation or protection. It must be assumed that this is the only site that can provide the kind of information already documented to exist there. Without its preservation through halting further impacts, that information (and the cultural values it embodies) will be irretrievably lost. Without stabilization of the deposits from further deterioration, the exposed cultural materials provide a lure for site destruction through vandalism. The stabilization will, therefore, help protect the site from human as well as natural impacts. Data collection and

analysis will allow evaluation of the site for listing on the National Register of Historic Places. The resulting information will provide significant insights into the prehistoric habitation of Prince William Sound for subsequent interpretation and educational programs.

PROJECT DESIGN

A. Objectives

1. Ameliorate and halt the deterioration and destruction of the site.

2. Protect and preserve the remaining cultural deposits.

3. Add to the scientific and cultural knowledge of the prehistory of the Prince William Sound.

The results of the project will include separate reports geared appropriately for professional archaeologists and for members of the general public.

B. Methods

The site is about 75 m long by 30 m wide, with a depth exceeding one m. Excavation of about 10 cubic m along the eroding site edge is proposed, with 6 subsequent 50 cm tests to more accurately define the boundaries of the site. Additional excavation of eight 1 m squares in the main body of the site would provide an adequate sample of the site to augment preliminary testing already accomplished.

Following the procedures set forth in pertinent legislation and guidelines, the project will mitigate the damage to the archaeological site through data gathering and physical restoration/stabilization. Final physical restoration will include backfilling, stabilization and/or revegetation of affected areas and archaeological tests.

The research design and field arrangements will be coordinated by a GS-11 (or equivalent) archaeologist/principle investigator (PI). The field crew will consist of the PI, one GS-9 (or equivalent) archaeologist and two GS-7 (or equivalent) archaeologists. The GS-11 archaeologist will coordinate analysis and report production. Reports will be in formats designed for both professional and public audiences.

All or parts of the project may be contracted out through the Forest Service. Sole source contracts for the work may be allowed if suitable "8A" contractors submit proposals. If no 8A contractor is so employed, contracting will be through established competitive means as established in Forest Service regulations, policy and guidelines.

A checklist of milestone dates will be kept by the Principle Investigator and the Forest Archaeologist for the Chugach National Forest. The quality and timeliness of field work, analysis, and report production will be monitored by the Forest Archaeologist.

C. Schedule

January 1, 1995	Start of consultation under the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act and preparation of work plans and research designs. Continuation of logistical and personnel planning.
July 5, 1995	Start of field work of site restoration work.
September 30, 1995	Completion of interim field report to USFS.
December 31, 1995	Completion of draft final report to USFS.
April 30, 1996	Completion of review by USFS and delivery to the ADNR.

D. Technical Support

The project requires qualified field and laboratory personnel, C14 dating, analysis of soils, faunal remains, artifacts and other remains, and permanent curation of collected material.

E. Location

The project site is located on Knight Island in Prince William Sound.

PROJECT IMPLEMENTATION

USFS will implement this project. This will be a continuation of restoration work conducted by USFS personnel at this site in FY 94. Data will be collected in a manner compatible with other archaeological restoration work according to an approved work plan.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Data gathering and analysis will be coordinated with project 95055 which entails development of a prehistoric biological data base for the EVOS area.

FY 95 BUDGET ($K)

Personnel	67.0
Travel	2.2
Contractual	32.0
Commodities	1.5
Equipment	1.0
Subtotal	103.7
Gen. Admin.	12.3
Total	116.0

Trophic Dynamics and Energy Flow: Impacts of Herring Spawn and Sea Otter Predation on Nearshore Benthic Community Structure

Project Number:	95009C
Restoration Category:	Research (new)
Proposed By:	Institute of Marine Science, UAF
Lead Trustee Agency:	USFS
Cooperating Agencies:	ADFG
Cost FY 95:	$217,300 (includes $74,510 in data analysis and report writing costs)
Cost FY 96:	$291,800
Total Cost:	Unknown
Duration:	3-5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Sea otter, intertidal and subtidal organisms

INTRODUCTION

Nearshore foodwebs are only partially understood and undoubtedly vary from site to site, especially with regard to source and magnitude of energy flow. The presence or absence of certain species or web connections, and the relative strengths of interactions common to most sites, are likely dependent upon source and magnitude parameters. Nearshore energy inputs are typically a mixture of local production, e.g. kelps, seagrasses and resident phytoplankton, and imported production, usually in the form of phytoplankton distributed by the overall current regime of the region.

Each spring, schools of Pacific herring enter Prince William Sound to deposit eggs on rocks, kelps and seagrasses in intertidal and shallow subtidal habitats. The herring, as well as some intertidal and subtidal organisms, have been identified as EVOS injured resources. The arrival of the herring at spawning sites marks the onset of a major, imported energy pulse at those sites. Not only are the eggs an energy source, but so are fish carcasses and fecal material as well as fecal inputs from mammalian and avian predators that track the herring. Herring densities and spawn deposits have been reduced since the EVOS and intertidal and subtidal communities have only partially recovered.

We propose to investigate the impact of herring spawning activities on intertidal and shallow subtidal foodwebs by comparing regular spawning sites with non-spawning sites. Each year, the Alaska Dept. of Fish and Game monitors the herring migration, spawning sites and the amount of spawn produced. We will cooperate with the ADFG in selection of two study sites based upon dependability of herring return and estimated magnitude of energy contribution. A non-herring site in the vicinity of each herring site will be carefully chosen for comparison. Candidates for the two pairs are northern Montague Island paired with northern Green Island and Bidarki Point paired with southern Bligh Island. Northern Montague and Bidarki Point are the most consistent sites of herring spawn deposition over the past ten years, while there has been little or no spawning activity at the other two sites during the same period.

In addition to the herring energy input work (bottom-up), we will investigate the impact of a dominant predator, the sea otter, on intertidal and shallow subtidal communities (top-down). Otters tend to be patchily distributed in the nearshore zone (pers. obs.). Thus, some areas are heavily utilized for foraging and others are not. Because sea otters do not have an insulating blubber layer, they depend upon their fur coat and a high metabolic rate to maintain body temperature. Consequently, daily consumption of benthic organisms by otters typically amounts to 20-30% of their own body weight. While sea otter impact on specific prey species can be locally devastating, other components of the community are likely affected also. For example, prey species such as butter clams are also utilized by the sunflower star *Pycnopodia helianthoides*. As butter clam densities are reduced, the seastar population may decline also. Sea otters are also known to prey on benthic predators such as seastars and octopus, and on sea urchins which are usually considered grazers but also scavenge and are sometimes predatory. Thus, otters impact nearshore communities at different trophic levels. In order to gain an understanding of sea otter influence on overall community structure, a heavily utilized region will be compared with Herring Bay, where otter densities are low and we have considerable information on the intertidal community. The sea otter utilization sites will be chosen in consultation with researchers working on sea otters. Initial indications are that regions on the north sides of Montague and Green Islands being considered for the herring work (see above and multi-disciplinary umbrella proposal) will also be suitable sea otter utilization sites, possibly resulting in considerable savings.

This proposal specifically addresses the contribution of marine invertebrates to food web complexity (both as predators and as prey), energy transfer and community structure at matched sites as a component of the multi-disciplinary nearshore ecosystem study, "Trophics and Community Structure in the Intertidal and Shallow Subtidal". Other components of the collaborative study will investigate nutrient supply, primary production and ecology of benthic plants, and the role of highly mobile (vertebrate) predators in the nearshore environment.

NEED FOR THE PROJECT

Pacific herring, intertidal organisms (some), subtidal organisms (some) and sea otters are considered to be not recovering from the EVOS. These groups are the main focus of this research proposal. Determining the course of energy flow through a community should reveal important structuring mechanisms. Understanding structuring mechanisms is necessary to distinguish between spill-related and natural changes in communities and to predict recovery rates and acceptable end-points. In cases of non-recovery, this knowledge may be critical. For example, normal mass spawning of herring probably swamps out local predators on both fish and eggs. With a greatly reduced spawning population, the relationship may be reversed, with fish, eggs and larvae so heavily preyed upon by the concentration of predators that recovery is further inhibited. Determining the effect of the herring-related energy pulse on the nearshore community should provide insights into how the source (type) and magnitude of energy inputs impact community structure and dynamics. Do kelp recruitment success and growth rates increase due to the enhanced nutrient (feces, carcasses, failed eggs) supply, resulting in damped onshore water motion and reduced food supply for filter feeders such as mussels and barnacles, and reduced larval supply for recruitment of intertidal organisms? If primary production is enhanced, will local grazer densities increase and will grazers such as sea urchins switch to herring eggs when available? Numerous other examples could be given. The herring-based energy pulse in local habitats may serve as a tracer, revealing important aspects of herring biology and nearshore community ecology.

With regard to sea otters, do they so broadly depress invertebrate prey populations that nearshore benthic communities are recruitment driven? Is the distribution of sea otters dependent upon the availability of certain prey species? Were densities of key members of the prey-species list reduced by the oil spill? Does the presence of otters invariably result in alternate communities (e.g. kelp vs no kelp via predation on sea urchins) as suggested in the literature. Do non-prey species increase in abundance when prey populations are depressed? For example, do infaunal polychaete worm populations increase when butter and steamer clam densities are substantially reduced? And can the worms prevent recolonization by clams through predation on newly settled clam larvae or juveniles? To what extent can varying concentrations of sea otters be sustained by the nearshore benthic community? Again, there are many important questions surrounding the role of sea otters in the nearshore environment and tracking energy flow should provide a framework for investigating non-recovery of both the otters and impacted components of the intertidal and subtidal communities.

PROJECT DESIGN

The general objectives of the herring spawn deposition study are given in the over-arching proposal, Trophics and Community Structure in the Intertidal and Shallow Subtidal. Briefly, three major hypotheses are presented: 1) localized energy inputs related to the spawn deposition increase productivity, standing crop and diversity; 2) mobile predators initially attracted by the spawn activities reduce standing crop and diversity by preying on less mobile resident species; and 3) the herring-related energy inputs have no lasting effect on the

community. The objectives of the study relative to sea otter site utilization are to examine the impact of sea otter predation on benthic community structure, including changes in the food web and major energy pathways.

A. Objectives

Specific objectives for 1995 include:

1. Establish study sites based on visits to candidate sites by the interdisciplinary team. See umbrella proposal for discussion of criteria.

2. Design interdisciplinary nested sampling schedules to examine site characteristics at several scales.

3. Within each focal site, measure abundance and distribution of specific intertidal and shallow subtidal invertebrates, particularly those preying on herring eggs, preyed upon by sea otters or having a major role in energy transfer or community structure.

4. Conduct stable isotope analyses (C, N and possibly S) on tissue samples of invertebrates as part of the overall effort to develop food web models at the study sites. Criteria for selecting species will be same as in No. 3.

5. Determine which invertebrates prey on herring eggs.

6. Determine which invertebrates prey on invertebrates in No. 5. Do the species change with habitat type?

7. Determine if benthic secondary productivity is enhanced by fecal inputs from herring and predators drawn to the spawn site.

8. Determine if mobile predators drawn to the spawn sites have a negative effect on the local invertebrate community. Rather than benefitting from the energy pulse, resident invertebrates may be subjected to unusually intense predation by the concentration of mobile predators. For example, groups of gulls have been observed vigorously attacking the large seastar, *Pycnopodia helianthoides*, during low tides. Seastars are ripe in the spring, making them an energetically rewarding prey item.

Objectives 1 and 2 will be completed in 1995. Studies will be initiated in FY95 to address the other objectives but will extend into FY96 and FY97 before completion.

B. Methods

As indicated in the objectives section, sites will be selected jointly by the principal investigators after visiting the candidate sites and consultation with other researchers working on herring spawning activities and sea otters.

Densities of herring egg predators, sea otter prey species and species having a significant role in energy flow at the study sites will be determined using a nested sampling design integrated with other components of the study. To the extent possible, densities of target species will be determined in the field. Distributions will be related to substrate and habitat type, particularly with regard to those utilized by herring for egg deposition and otters for foraging.

Tissue samples of the species of interest will be collected and analyzed for carbon and nitrogen stable isotope ratios to investigate energy flow pathways and relative strength of food web linkages. Stable isotope data on herring eggs will be provided by E. Brown (ADFG). In addition, direct observations of feeding activities will be made and quantified where possible. Gut contents or fecal material of freshly collected invertebrate predators, including suspected herring egg predators, will be examined (undigested material and hard parts can often be identified and our laboratory has considerable experience with this type of work). Feeding experiments will be conducted at the University's Kasitsna Bay Laboratory to determine prey choice of certain invertebrate predators, particularly potential herring egg predators such as *Strongylocentrotus droebachiensis* (green urchin), *Pycnopodia helianthoides* (sunflower seastar), *Leptasterias hexactis* (seastar), *Fusitriton oregonensis* (hairy triton), *Nucella* spp. (whelks), and the common crabs *Cancer oregonensis* and *Telmessus cheiragonus*. For example, feeding experiments will be conducted with amphipods. Preliminary examination of benthic quadrat samples collected by ADFG at herring spawn sites indicates that amphipods (6 families) are abundant, including lysianassids which are well known predators and scavengers. *Leptasterias hexactis* and juvenile *P. helianthoides* also occurred in the quadrat samples. Field manipulations (transplants, enclosures, exclosures, etc.) will not be attempted in 1995 but may be included in study plans for subsequent years based upon 1995 results.

Densities and size-frequency distributions of major sea otter prey species (*Saxidomus giganteus, Protothaca staminea, Mya truncata, M. arenaria, Macoma spp., Telmessus cheiragonus* and mussels) will be determined at the low and high otter usage sites.

At soft-bottom herring spawn sites, sediment samples will be collected for CHN analyses in comparison with samples from non-spawn sites. Collections before, during and after the spawning activity should reveal whether there is organic enrichment through transport of herring and herring predator fecal material. Densities of infaunal organisms will also be compared between sites.

C. Schedule

Winter, 1995: Personnel selection, purchase supplies and materials, team planning workshop

Spring, 1995: Site visits and site selection, preliminary tests of experimental protocols, initiate study (especially at herring spawn sites), begin feeding studies and isotope analyses

Summer, 1995: Data collection and sampling at study sites, feeding studies, isotope analyses, preliminary examination of data

Sampling will be conducted quarterly. Report writing will be ongoing throughout the year with annual report submission in April of each year.

D. Technical Support

Stable isotope and CHN analyses will be conducted at the Institute of Marine Science, UAF. We are experienced at conducting these analyses. Sufficient replicate samples will be analyzed to meet statistical requirements. Computer services and data management will be provided by IMS.

E. Location

The work will be conducted in Prince William Sound. Study sites under consideration are northern Montague Island, northern Green Island, Bidarki Point, southern Bligh Island and Herring Bay. Reasons for considering these sites were presented in the Methods section.

PROJECT IMPLEMENTATION

This project should be implemented by the U.S. Forest Service through the various cooperating agencies.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is part of a coordinated study to be conducted by scientists from the University of Alaska, Prince William Sound Science Center and the U.S. Forest Service. The herring related work will be done in close collaboration with ADFG, including some data sharing and sample collecting. The work will also be coordinated with vertebrate predator studies in the NBS program. Collaboration will also occur with the SEA study through physical oceanography, herring, nearshore fish and avian predation studies.

FY 95 BUDGET ($K)

Personnel	124.5
Travel	10.2
Contractual	20.0
Commodities	6.5
Equipment	15.0
Subtotal	181.1
Gen. Admin.	36.2
Total	217.3

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Survey and Experimental Enhancement of Octopuses and Chiton in Intertidal Habitats

Project Number:	95009D
Restoration Category:	Research (new)
Proposed By:	Prince William Sound Science Center and West Coast National Undersea Research Center
Lead Trustee Agency:	USFS
Cost FY 95:	$188,900
Cost FY 96:	$177,000
Total Cost:	Unknown
Duration:	2-5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Subsistence, intertidal organisms

INTRODUCTION

Nearly 90% of the residents of Tatitlek, Chenega Bay, and Cordova used marine invertebrate subsistence resources prior to the *Exxon Valdez* oil spill. Some portion of these marine invertebrates are octopus, traditionally harvested from their dens in the intertidal zones by subsistence users. Subsistence users in Prince William Sound have noted apparent declines in octopus and other species (e.g., gumboot chiton) since 1989. Although no connection to damage by oil has been established, the decline of these mollusks following EVOS further reduces subsistence resources available for residents in the EVOS affected area. This proposal is for funds to survey intertidal octopus and gumboot chiton densities at several sites, provide information on habitat use and distribution for these species, and explore the potential of artificial dens as a cost-effective survey technique and as a way to enhance local octopus density.

Oil from the *Exxon Valdez* had a large impact on organisms in intertidal areas. As populations in these areas respond to this disturbance, the composition of intertidal communities may change dramatically. This will affect all species using the intertidal, not only those documented as injured by exposure to the oil. Changes in the abundance of many species are to be expected in these circumstances. In addition to mollusk declines, noted changes include, among many others, local declines in sea otter abundances and increases in opportunistic algae.

Octopuses and chitons are both important prey of sea otters in areas where high otter density has persisted over several years. Declines in octopuses may therefore be a result of changes in sea otter density over recent decades. Alternatively, if octopuses were adversely affected by *Exxon Valdez* oil, their decline may result in less food for recovering otter populations. Octopuses are also efficient predators on other invertebrates and small fish in the intertidal, and may be an important element in the intertidal trophic structure.

The extent, severity, and cause of octopus declines are not known. Nor is it known if changes in the abundance of these mollusks will adversely affect the recovery of other intertidal species. Without information of this type, the course of recovery of octopus in the intertidal cannot be predicted, nor can this resource be managed as effectively as possible.

NEED FOR THE PROJECT

Octopuses and chitons are included as injured, non-recovering species under the general headings of subtidal organisms and intertidal organisms. Subsistence use of these resources in Prince William Sound has resulted in the knowledge that these species have declined in apparent abundance. The extent, severity, and cause of these declines are unknown, but comprise a part of the decline in subsistence services.

This project proposes a survey of these species to initially assess the extent of declines, as well as a test of potential monitoring and restoration of octopus through artificial den construction. Information from this study will be conveyed to subsistence users.

PROJECT DESIGN

A. Objectives

The overall purpose of this project is to assess site-to-site variability in octopus density as indicated by use of natural intertidal dens, to measure habitat associations of octopus in the intertidal, and to test artificial den placement as a means of 1) surveying octopus densities and 2) enhancing octopus densities. As a secondary goal, we will survey chiton density during octopus surveys.

For 1995, sampling will be focused at the sites of the "Trophics and community structure in the intertidal and shallow subtidal" projects, in order to share costs with those projects. An additional survey site will be identified that has been harvested in recent years. Once successful techniques are developed from the 1995 work, sites designed to monitor octopus in other subsistence areas may be added.

1. Consult with subsistence users in Tatitlek to improve study design, identify a suitable survey site with a history of harvest, and recruit collaborators. Tatitlek is chosen here because of its proximity to TCSISS sites identified for sampling.

2. Conduct seasonal surveys of octopus use of natural dens in intertidal areas during low tides. Measure distribution and density of gumboot chiton in the same areas.

3. Test short-term placement of artificial octopus dens as a technique to survey local octopus density.

4. Test long-term placement of artificial octopus dens as a technique to enhance local octopus density.

5. Examine octopus distribution and density in light of results from this and other TCSISS projects to formulate specific hypotheses about factors constraining octopus abundance at sampling sites.

B. Methods

1. In collaboration with Jody Seitz (SEA Planning and Communications), involvement of subsistence users of octopus will be solicited for the goals stated above.

2. At low tide, foot surveys will be conducted along transects for occupied intertidal octopus dens. Potential and occupied den locations along a survey will be noted to estimate the proportion of den sites that appear to be occupied. Surveys will be stratified according to habitat types identified in the "Mobile Foragers" and other projects. At each location, local octopus density will be assumed constant over a period of a few days, and repeated surveys will be used to estimate variance in the sampling technique.

3. Octopus are known to use artificial structures as temporary den sites. We will design artificial dens and place them in the intertidal and shallow subtidal to evaluate the placement of artificial dens as an octopus survey technique. Octopus should use the dens, and artificial den occupancy will then serve as an indicator of local octopus density, much as a trapping grid can indicate rodent density in a grassland.

4. If suitable den sites are limiting to octopus, the addition of permanent dens to areas with few octopus should enhance octopus density. We will artificially increase den availability in restricted areas and evaluate the cost-effectiveness of this technique to locally increase octopus density.

5. If dens are known to be utilized, yet do not increase octopus density over time, this strongly suggests that octopus density is limited by prey availability or recruitment, and not by den availability or predation. Results from this survey and other projects will be used to develop testable hypotheses about the cause of apparent declines in octopus and/or gumboot chiton.

Den selection as a survey tool presents several challenges to the researcher. First, artificial dens must be designed to be suitable, or octopuses will not utilize them. However, it is relatively simple to design artificial dens that octopuses will inhabit, the requirements being that the den be opaque and have an enclosed space with a narrow opening. In addition, because sea otters will prey on octopuses denning in containers such as aluminum soda cans, we will make artificial dens which resist attack by sea otter. Second, if artificial dens are preferred to natural dens, octopus may abandon traditional dens to use artificial ones. In the extreme, this may mean that we find 100% occupancy of artificial dens over a wide range of local octopus densities. However, this effect will be clearly discernable from the survey results, and experimental design can be manipulated (design and density of artificial dens) to minimize it. Further, experiments with artificial den placement along census transects will be used to estimate octopus preference for artificial over naturally-occurring dens. Finally, if additional dens successfully enhance octopus densities, we must evaluate den placement as a survey technique in light of the knowledge that den placement increases octopus use of the area. When using dens to estimate local octopus density, this effect will be minimized by the limiting the duration that dens are in the water. Over the short term, artificial dens are likely be occupied by octopus already in the area, indicating local density.

Artificial dens may enhance local octopus density under two conditions: first, if den availability limits recruitment of juvenile octopus to an area; and second, if predation limits octopus densities and den availability limits predation rates on octopus. Dens will fail to enhance octopus density if den availability does not limit recruitment, does not limit predation rates or if neither recruitment nor predation rates limit octopus densities. Hence, results of experimental den enhancement will guide the formulation of specific hypotheses about octopus declines.

C. Schedule

Winter '95:	Personnel selection and equipment procurement. Site visits and site selection, laboratory design of artificial dens, preliminary tests of experimental protocols. Initiate visits and collaboration with subsistence users of octopus and chiton.
Spring '95:	Foot and artificial den surveys; habitat mapping. Experimental assessment of den preference.
Summer '95:	Foot and artificial den surveys; habitat mapping. Experimental assessment of den preference. Experimental test of artificial dens as octopus enhancement tool. Preliminary examination of data.
Sept-Oct '95:	Additional surveys
Nov 30 1995:	Draft report
Jan 30 1996:	Final report

D. Technical Support

In order to meet the stated goals, this project will need access to community knowledge of local harvest sites and site history. This will most likely be solicited from Tatitlek.

E. Location

This work will be conducted in Prince William Sound. Specific focal sites under consideration are northern Montague Island, northern Green Island, Bidarki Point, southern Bligh Island, and Herring Bay.

PROJECT IMPLEMENTATION

This project should be implemented by the U.S. Forest Service through the various cooperating agencies.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is part of the "Trophics and Community structure in the intertidal and shallow subtidal" program and will share logistics, personnel and study sites with other projects. Data and results will be shared among these projects. Each project therefore benefits from additional knowledge of a sampling site that would not otherwise have been collected.

This project shares a goal, that of understanding factors constraining a predator's use of habitats, with the project "Community structure of mobile foragers using the nearshore". Both projects will share a principal investigator (D. Scheel) and both will rely upon the same logistics for sampling.

Air and boat transportation necessary to get researchers to remote locations in PWS will be shared with other projects having similar needs.

FY 95 BUDGET ($K)

Personnel	6.6
Travel	3.3
Contractual	147.5
Commodities	0.0
Equipment	0.0
Subtotal	157.4
Gen. Admin.	31.5
Total	188.9

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Killer Whale Monitoring in Prince William Sound, Alaska

Project Number:	95013
Restoration Category:	Monitoring (new)
Proposed By:	North Gulf Oceanic Society
Lead Trustee Agency:	NOAA
Cost FY 95:	$113,700
Cost FY 96:	$0
Total Cost:	Unknown
Duration:	Alternating years until recovery
Geographic Area:	Western Prince William Sound
Injured Resource/Service:	Killer whale

INTRODUCTION

Baseline population information based on photoidentification was collected by members of the North Gulf Oceanic Society (NGOS) prior to the EVOS. This data was used for damage assessment following the EVOS. The EVOS Trustee Council funded this work in 1989, 1990, and 1991. Damage assessment fieldwork for Prince William Sound was completed, and the data was analyzed, and published by NGOS under contract to the National Marine Mammal Laboratory. A total of 13 whales were lost from AB pod (initially 36 whales) between March 1989 and June 1990. Through recruitment the pod increased from 23 whales in June 1990 to 26 whales in 1993, it will require years for complete recovery. Nine whales in the AT1 transient group have not been photographed since 1989. Because immigration and emigration between transient groups does occur, we cannot be certain these missing whales are mortalities (except for one which was identified dead on a beach in 1990). However, we strongly suspect that they are dead. As a result of these findings, killer whales (*Orcinus orca*) have been listed by the EVOS Trustee Council as a damaged but recovering resource.

We propose to continue a monitoring program of resident and transient killer whales in Prince William Sound and to interface this program with proposed ecosystem studies. The program will focus on the population dynamics of AB pod and the AT1 group in relation to other resident and transient groups that use Prince William Sound.

NEED FOR THE PROJECT

Without careful monitoring of the damaged/recovering killer whale population, it will not be clear whether recovery has occurred. Because killer whales demonstrate a low reproductive rate long-term monitoring is necessary to clearly establish that recovery has or has not occurred. Careful analysis may identify problems that might inhibit recovery. Although AB pod appears to be recovering at this time, the status of the AT1 group is uncertain and should be monitored as well. The dynamics of these groups should be judged relative to the changes within the other frequently encountered pods. This necessitates a thorough census of all pods that regularly use the study area.

PROJECT DESIGN

A. Objectives

1. To photographically identify resident and transient killer whale pods in Prince William Sound.

2. To map population dynamics within all pods and monitor recovery or lack of recovery of injured groups.

B. Methods

Methods will be similar to those used by the NGOS to monitor killer whales in Prince William Sound for the past ten consecutive years. Photoidentification of each individual in each pod/group will be the primary tool. Photographic negatives will be analyzed using a photographic database that spans ten years. Identities of each whale that appears in every frame of usable film will be recorded and stored in VAX computer system. Final analysis and assessment will follow Matkin et al.

C. Schedule

Monitoring should occur in 1995 and at least every other year thereafter until full recovery is demonstrated (only 1995 is budgeted here). Field work will occur in July/August/September of 1995. A total of 90 vessel days will be spent in the field. Data analysis will occur in October and November. A draft report will be submitted by late December followed by a review period of two months. The final report will be submitted by April 1996.

D. Technical Support

The NGOS owns or will lease all equipment necessary for the successful completion of the project. A frame by frame analysis of photographic data will be computerized and archived with a copies supplied to the National Marine Fisheries Service and the Prince William Sound Science Center. NGOS has archived all photographic data collected since 1984 in an established computerized format.

E. Location

Field work will center in southwestern Prince William Sound. Vessels will be operate from Chenega Village and dock space rented from the Village Council. Fuel will be stored at Port San Juan and Chenega Village. (We currently have a fuel storage agreement with Port San Juan and Chenega). As in the past, close contact will be kept with tourboat and recreational boaters in the area. An observer's network which exchanges information on whale sightings has been maintained for 10 years in western Prince William Sound.

PROJECT IMPLEMENTATION

Accurate long-term monitoring is essential to determine recovery of this injured resource. The proposed project complements long-term systematic research projects begun by the North Gulf Oceanic Society 1983. The methods employed in the proposed work and the historic database essential for interpretation were developed by NGOS. Data collection has been supervised by the same individuals and photoidentifications made by the same individuals from 1984 to 1994. During that ten year span, over 50,000 frames of film have been examined and each whale in each usable frame of film identified. The validity of the photoidentifications has been tested independently and found to be accurate. The NGOS maintains the specific equipment (boats, cameras, lab equipment, etc.) and expertise to continue this project in a consistent and cost effective manner.

This is a significant opportunity for the Council to fund a project conducted by a private Alaskan entity, staffed by individuals who reside and work in the spill area and who were conducting similar work prior to the EVOS. It would appear contrary to the intent guidelines established by the Trustee Council and PAG to fund a government agency at the exclusion of established and professional local expertise. If this project is delegated to an agency (as in 1993), there will be no opportunity for this research to be conducted by private entities.

NGOS is maintaining ongoing killer whale studies in Prince William Sound in 1993. A biopsy sampling for killer whales has recently been initiated. Genetic analysis of these tissues will help identify populations of killer whales. It will be accompanied by analysis to determine levels of environmental contaminants in the whales.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Researchers will coordinate efforts with hydroacoustic surveys conducted under the Sound Ecosystem Assessment Plan (SEA) and the Prince William Sound Science Center. (NGOS operates with a memorandum of understanding with the PWSSC). Data necessary for interpretation of the proposed "Effects of Killer Whale Predation on Recovery Rates of Injured Resources" (NMML/NMFS) or other EVOS projects will be provided to the appropriate agencies.

FY 95 BUDGET ($K)

Personnel	46.6
Travel	4.0
Contractual	25.2
Commodities	11.0
Equipment	0.0
Indirect Costs	18.1
Subtotal	104.9
Gen. Admin.	8.8
Total	113.7

Predation by Killer Whales in Prince William Sound: Feeding Behavior and Distributions of Predators and Prey

Project Number:	95014
Restoration Category:	Research (new)
Proposed By:	North Gulf Oceanic Society and Prince William Sound Science Center
Lead Trustee Agency:	NOAA
Cost FY 95:	$177,600
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Killer whale and harbor seal

INTRODUCTION

The classic view of predator-prey relationships is that prey populations are limited through losses to predation while predator populations are limited by restricted numbers of available prey. However, this view has often been unsatisfactory because apex predators in any system are usually diet generalists. That is, the composition of their diet will change with prey availability. Decline of a common prey may result in prey-switching, rather than in a population-level decline in apex predator numbers. The consequences of prey switching are that predation rates on one prey species can vary independently from the population size of both that prey and the predator.

Prey switching allows predator populations to remain high, even when some prey species decline. Non-lethal effects of predation increase the costs of risky activities (such as foraging) for prey species. Prey-switching has already been recognized as a possible factor important in the recovery of pink salmon (juvenile pollack possibly switch from zooplankton to salmon fry when zooplankton abundance is low). Now consider that two of the most visible, index species of apex predators affected by EVOS, bald eagles and killer whales, are both listed as "Recovering", while important food sources for these species are "Not recovering" (e.g. pink salmon for eagles, salmon and harbor seals for killer whales). In addition, according to researchers at recent EVOS Trustee-sponsored workshops, losses to these predators may be

contributing to declines or lack of recovery in harbor seals, kittiwakes, and sea otters.

Food availability is considered the probable cause of failure to recover from oil spill injury for some populations, with predation pressure considered as an alternative hypothesis. However, predation pressure is related to food availability, because predators respond to changes in their prey populations by prey switching, and because foraging and other risky activities become more costly when predation risk is high. In part because population sizes of predators appear to be recovering from EVOS-related mortality, little attention has been given at workshops to discussion of predator diet or its impact on other resources.

Some additional work is needed to more completely understand the role of predation by killer whales in Prince William Sound. Investigations into the food web dynamics of killer whales have been proposed using stable isotope and fatty acid analysis. Additionally, historical data on killer whale distributions, and feeding behavior are available. These data should be analyzed in conjunction with continued field observations in Prince William Sound to determine to what extent killer whale diet or habitat use has changed. Changes that are correlated with the distribution of prey indicate that prey-switching has occurred. This analysis should be coordinated with a feeding behavior/habitat use model of predation rates in order to estimate the impact of whales on their primary prey populations.

NEED FOR THE PROJECT

This proposal is focused on killer whale predation in Prince William Sound. The killer whale was injured by EVOS and is currently listed as recovering. However, a number of staple prey species of killer whales are listed as injured and not recovering. These include harbor seals, pink salmon, and Pacific herring. At least for harbor seals, predation by killer whales is considered an important alternative to the food limitation hypothesis as an explanation for continued lack of population growth. The unrecovered status of these species may alter whale feeding patterns and behaviors. Further, the recovery of these species may be impacted by predation by whales.

PROJECT DESIGN

A. Objectives

This project addresses the role of killer whale predation in Prince William Sound, and will accomplish five objectives:

1. Analyze historical data on feeding, habitat use and distribution of killer whales.

2. Continue field studies to photoidentify and record distribution and feeding behavior of killer whales in PWS. Pre-spill patterns of behavior documented in (1) will be compared to current behavior to evaluate prey-switching or other changes in whale behavior.

3. Determine if residents and transients killer whale pods using PWS are distinct genetically, and continue estimation of feeding differences between the two types.

4. Expand sampling of killer whale distributions into late fall and winter to determine year-round residency of whales in the Sound. This will be accomplished through remote, acoustical sampling in southwestern PWS.

5. Develop trophic models based on (1-3) to evaluate the flexibility of whale diets and to estimate the impact whales have on their prey populations in PWS. This objective will utilize information from a number of EVOS studies (acoustic sampling of pink salmon and herring, forage fish distributions, harbor seal distribution and habitat use, killer whale food-web relationships, killer whale genetic studies) to provide the best possible numerical estimates of predation rates.

B. Methods

Analyze historical data on feeding, habitat use and distribution of killer whales using GIS. Documentation of historical whale behavior is needed to establish trends related to the changing availability of prey in their environment. Private and public data have been collected by this group of researchers on killer whales since 1983. Locations of all sightings, behavior, and information on prey types recorded during each siting will be entered into a geographic information system. The extent and geographic distribution of sampling effort will also be reconstructed. Feeding data from stomach contents, scales from fish attacked by the whales, and marine mammal tissue collected following kills is also available. Using this database, historical movements and behaviors of whales will be analyzed for evidence of changes in diet or area-use patterns. Critical area will be identified and feeding behaviors will be related to the distributions of prey (data on prey distribution is being collected under SEA and other studies).

Continue field studies to identify and record distribution and feeding behavior of killer whales in PWS. Detailed photographic records of sightings provide the continuity necessary for this long-term study. This segment of the proposal relies on the monitoring of the killer whale population injured in EVOS. In addition, further data on movements and feeding behavior is needed to document dietary changes (if any) and to estimate predation rates on harbor seals, salmon, and other species. Behavioral data will be taken at each encounter while researchers are with the whales. Where possible, samples of prey remains (e.g. fish scales, tissue from marine mammals) will be collected as the whales feed. This technique has been used successfully in the past. However, it has not always been possible to know what whales are feeding on. By running this study in the same area and at the same time as the SEA program, detailed observations on the general distribution and composition of fish schools will allow

greater certainty in identifying whale prey. A concurrent study examining isotope ratios and fatty acid composition may provide complementary data on gross diet composition.

Assess genetic differences between transient and resident-type pods using Prince William Sound. Behavioral observations in the Sound and limited genetic work in other areas suggest that at least two populations of killer whales (resident and transient) exist sympatrically in the Gulf of Alaska, and use Prince William Sound. Whales of both types appear to have been lost since the EVOS (from AB pod and the AT1 group, respectively. However, while the AB pod appears to be recovering numerically, the AT1 group is not. To the extent that the two killer whale types are genetically and behaviorally separate, the AT1 group may represent a distinct, non-recovering population. Further, there is evidence, that at least seasonally, the AT1 group consumes primarily marine mammals while resident whales (AB pod and others) consume primarily fish in the Sound. Thus, to adequately understand the impact that whale predation has on marine mammal populations in Prince William Sound, it is important that the level of genetic separation and differences in food habits be established for these potentially distinct populations.

Expand historical sampling into late fall and winter to determine year-round residency of whales in the Sound. It is currently not known how many whales stay in PWS into the winter, nor for how long. This is due to sampling limitations from winter weather and low light conditions that limit photography. However, this data is necessary in order to fully understand the impact whales may be having on their prey. We will use a hydrophone system to monitor killer whale movements year round. Each resident pod of killer whales has a unique dialect of vocalizations, allowing individual pod recognition by voice-print. Two hydrophone systems will be placed in the southwestern Sound. When whales are in acoustic range, a voice-activated system records their vocalizations. The system can be monitored by VHF radio from a nearby fish hatchery. Recordings will be used to determine the duration of residency for specific pods during all months of the year.

Develop trophic models based on (1-3) to evaluate the flexibility of whale diets and to estimate the impact whales have on their prey populations in PWS. Using data from this study, in conjunction with fish distributions from SEA and forage fish studies, and isotope/fatty acid results from the proposed NMFS studies, we will model predation rates of whales in PWS. The model will link whale behavior (foraging, habitat use) with predation rates on their primary food species (suspected to be harbor seals and salmon). As apex predators, whales are generally flexible in their diet (although there is some evidence that this is not the case with killer whales). We will model the effects on different prey of prey-switching by whales, to evaluate how changes in one prey populations may be linked to the availability of alternative prey.

C. Schedule

Input of historical data into the PWSSC GIS system will begin in November 1994. Fieldwork will coincide with the "Killer Whale Monitoring" program. The final report for year one will be submitted by April 1996. A simplified model will be constructed by the end of year one. A more detailed model will be completed by year two, April 1997.

D. Technical Support

Data input, computer and GIS support will be provided by the Prince William Sound Science Center. Field equipment and support will be provided by the North Gulf Oceanic Society.

E. Location

Field work will be centered in western Prince William Sound, Alaska.

PROJECT IMPLEMENTATION

The project should be implemented as a combined effort of two spill area non- profit groups, the NGOS and PWSSC. NGOS owns or leases all equipment needed to complete the field operations in this project. NGOS will provide the historical feeding data necessary for the analysis and modeling. NGOS is currently collecting biopsy samples from killer whales for the initial genetic analysis. The PWSSC has the GIS system in place and the modeling and computer capabilities necessary to complete the project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Research efforts in the field will be tightly coordinated with the SEA plan surveys. This research will be coordinated with the SEA research program, and will utilize results of SEA modeling. This project also integrates with harbor seal, and forage fish studies. Data analysis will be coordinated with the proposed studies under the Marine Mammal Ecosystem group.

FY 95 BUDGET ($K)

Personnel	97.6
Travel	5.4
Contractual	14.0
Commodities	6.8
Equipment	5.5
Indirect Costs	32.7
Subtotal	162.0
Gen. Admin.	15.6
Total	177.6

Partitioning of Primary Production Between Pelagic and Benthic Communities

Project Number:	95018
Restoration Category:	Research (new)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	ADFG
Cooperating Agencies:	NOAA
Cost FY 95:	$219,200
Cost FY 96:	$152,200
Total Cost:	$371,400
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

Particulate organic carbon (POC) derived from phytoplankton is the primary source of food and energy for marine organisms. Consequently, the dynamics of primary production and the subsequent fate (e.g. horizontal advection, consumption, flux, accumulation, mineralization) of the generated POC are one of major importance to a holistic study of any marine ecosystem investigations. This is particularly relevant to the SEA (Sound Ecosystem Assessment) hypothesis that has been developed for Prince William Sound. The hypothesis essentially states that the ecological state of Prince William Sound is closely linked to the oceanographic forcing of circulation in the Sound which alternates between years of strong through-flow river-like conditions, and relatively stagnant, lake-like conditions. The changes are controlled by the extent of ingress of Gulf of Alaska waters into the sound. One of the suggested implications of the hypothesis is that the rate of primary production in Prince William Sound controls the standing crop of primary consumers (e.g. zooplankton) and associated higher trophic organisms (e.g. salmon, herring, bottom fish species). For the benthos, the flux of phytodetritus within the water column is the linking factor to primary production. For high standing crops of zooplankton it is critical that a sustained supply of phytoplankton is available. In contrast, high flux of POC to the bottom would be vital to support a high abundance of benthic animals. It is conceivable that in areas of high primary production, the concentrations of zooplankton may not correspondingly be high because of loss of the phytodetritus and phytoplankton from the

generating euphotic zone via horizontal advection and/or rapid sinking. However, the strong relationship between primary production and particle flux out of the euphotic zone has been amply demonstrated in numerous studies). The extent of correlation between the two would, of course, depend upon the grazing rates and hydrodynamics of water flow. Thus, it is imperative that investigations relating to the partitioning of particulate organic carbon (POC) within the water column be an integral part of the SEA study.

In Prince William Sound there is no regional data base available on the flux of POC either to the bottom or within the euphotic zone. However, extensive data are available, spanning over several years (1979-1991, including pre- and post *Exxon Valdez* spill years), on the concentrations and accumulation rates of organic carbon, nitrogen, C/N ratios and stable isotopes of organic carbon in sediments from widely-located stations in Prince William Sound. The only data published on the POC flux is that locally for Port Valdez. In Port Valdez there is apparently a close link between the yearly concentrations of benthos and zooplankton with implied coupling with the POC flux and primary consumers. Given the extensive data base that we have on organic carbon contents as well as accumulation rates of sediments, studies to determine water column POC fluxes would help to complete the carbon budget, and define food web linkages within the overall ecosystem of Prince William Sound. Our proposed investigation will include the deployment of a mooring with two sediment traps at a selected location in central Prince William Sound, to obtain time-series (monthly) and sequential samples of mass particle and POC flux. This project will be closely integrated with the proposed studies by Drs. McRoy and Eslinger on nutrient dynamics and primary production and will ultimately have strong bearing on the investigations on zooplankton led by Dr. Cooney under the SEA project.

PROJECT DESCRIPTION

As mentioned earlier, our proposed investigation on particle and POC flux will have strong relevance to understanding the role of carbon flux partitioning in the supply of food to pelagic primary consumers and to the benthic system. The data obtained under this investigation will be shared with Drs. McRoy, Eslinger and Cooney in attempting to test the SEA hypothesis, and with other investigators working in the sound area.

In attempting to address damage assessment/restoration of the Prince William Sound ecosystem subsequent to the *Exxon Valdez* oil spill, it is critical first to have a quantitative understanding of the natural forces and processes which drive the ecosystem of the sound. This concern has been identified by the EVOS Trustee Council as a high priority research topic. Without the above baseline it would be difficult, except in obvious high direct impact situation, to make any value judgement as to what the damages and restorations may have occurred consequent to the spill. Therefore, the investigations proposed under the SEA hypothesis, of which our studies will be a complementary component, will serve an useful purpose in assessing damage and designing steps for restoration. Our study will link the individual yet related investigations that are being proposed by Drs. McRoy and Eslinger on primary production and by Dr. Cooney on zooplankton dynamics. Additionally, we will examine our data on time-series changes in the

carbon flux within the water column in context of the investigation on hydrodynamics that are being proposed by Dr. Salmon. In fact, all the above studies have been conceived, with mutual understanding, from the standpoint of a multidisciplinary approach to ecosystem analysis. Perhaps the results of our investigations and that of the SEA, could be extended to nearshore regions which are now being impacted by crude reworked from the beaches, to help assess the causes of environmental changes.

A. Objectives

1. To estimate the time-series variations in the natural vertical fluxes of particulate organic carbon (POC) in Prince William Sound, and the partitioning of the flux between faecal pellets and loss of intact diatom cells via sinking.

2. To establish the relationship between our data on time-series changes in the POC fluxes and the timing and biomass of phytoplankton cycles that Drs. McRoy and Eslinger have proposed to measure and the time-series changes in hydrodynamics that would be recorded at the C-Lab and other buoy stations in Prince William Sound. The overall objective of this task would be to test the SEA hypothesis.

3. To integrate the water column POC flux data with the sediment POC accumulation rate estimates that are available from our previous work in the sound. This will assist in assessing the demand and consumption of POC by benthos and the rates of organic matter remineralization and burial.

B. Methods

To successfully meet the task objectives of this proposal the flux measurements must be closely integrated with the studies that have been proposed by other investigators of the SEA project, especially with the phytoplankton and zooplankton studies. The flux measurements will be carried out by taking time-series (monthly) samples of POC flux using two sets of sediment traps. The trap design will be after the prototype model PARFLUX Mk6, which is one of the most sophisticated types in use today. This trap has the capability of collecting time-series, sequential flux of settling particles with flexible intervals without hiatus for 18 months. The sampler has a 0.52m intake vent which opens into individual receptacles that rotate into position sequentially at preset time intervals programmed by a microprocessor (refer to Asper, 1988 for further details on the trap design and operation).

We propose to deploy two sediment traps, effective November 1994, at different depths on a mooring that has an array of instruments deployed by the SEA investigators and/or Dr. D. Salmon. The flux measurements will be carried out for two years, which will allow assessment of the changes in fluxes between years and several seasonal cycles that might have significant shifts in the rate of primary production. Care will be taken to ensure minimum interference by other instruments in the collection of vertical flux of settling particles. One of the traps will be emplaced just below the thermocline and the other near the bottom of the sound at water depth where resuspension of particles is assumed to be absent. The upper trap samples will provide

estimates of the time-series fluxes of POC out of the euphotic zone and thus the food supply available to the primary consumers. The lower trap samples will provide estimates of the time-series fluxes of POC to the sound floor. Each of the sample receptacles in the trap will be filled with water having a density higher than the surrounding water to help retain the trapped particles in the receptacle. This high density water will be poisoned with HgCI to preserve the samples from bacterial degradation. The exact time of deployment and retrieval of the traps will be noted.

Each of the samples collected in the field will be transferred into prewashed glass bottles and stored frozen (-20.O C) until ready for analysis. The determination of the total particulate content, POC, N and C/N will be after the methods outlined in Feely et al. (1991), Knauer (1991) and Bodungen et al. (1991). Briefly, each of the samples will be filtered through GF/F glass filter membrane which has been prewashed with deionized water, precombusted at 500° C for 4 hrs and preweighed. Following filtration the samples will be rinsed in deionized water to free the samples of salts. The dry weight of particulates retained on the membrane divided by the days of deployment and the trap mouth cross-sectional area will provide the total flux rate of particulates. Prior to analysis of the POC the samples will be exposed to vapors of a weak acid to remove carbonates. The concentrations of POC and N, which will be analyzed in an automatic CHN analyzer, will be reported on a dry weight basis. The sediment traps will be calibrated against known rates of Pb-210 based sediment accumulation rates for the study area.

C. Schedule

The start date for this project will be October 1, 1994 and the end date will be September 30, 1996. It is intended to collect flux samples for every month starting from November 1994, so that we will have samples corresponding to various seasons and cycles of primary productivity. During the above duration it is assumed that productivity, zooplankton and hydrographic data will be simultaneously collected by the SEA project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

As mentioned earlier, this project will closely interact with other studies, especially those that are being proposed under the SEA project and by Dr. D. Salmon on water circulation. Sample collection will be in conjunction with the SEA project and the deployment of the sediment traps will be integrated with the mooring to be set by the SEA project and/or by Dr. Salmon. The POC flux data will be integrated and examined in context of the data that will be obtained by the investigators addressing the phytoplankton, zooplankton, and water mass dynamics. We will fully cooperate and be involved with the modelers who will be testing the SEA hypothesis and other ecosystem modelers working in Prince William Sound. The proposed study has been discussed with the investigators of the SEA project and with Dr. Salmon, all of whom have agreed to collaborate. The budget reflects support for the effort involved by Dr. Salmon in the mooring operations. We will be needing four days of ship time in a year for the deployment and retrieval of the sediment traps. It is anticipated that the ship time will be provided by the Alaska Department of Fish and Game as an overall effort in the deployment of moorings

concerned with the SEA project and/or Dr. Salmon's hydrographic investigations. However, sufficient funds have been budgeted in our proposal to share part of the cost of the trap deployment. The cost of the acoustic release (10K) as stated in the subcontract proposal will be refunded to the EVOS Trustee Council in case the primary responsibility of the installation, deployment and recovery of the moorings to which our sediment traps will be integrated, is entrusted to investigators of the SEA project.

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	197.1
Commodities	0.0
Equipment	0.0
Subtotal	204.3
Gen. Admin.	14.9
Total	219.2

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Distribution of Forage Fish as Indicated by Puffin Diet Sampling

Project Number:	95019
Restoration Category:	Research (new)
Proposed By:	National Biological Survey
Lead Trustee Agency:	DOI
Cost FY 95:	$271,300 (includes data analysis and report writing costs.)
Cost FY 96:	$218,300 (includes data analysis and report writing costs)
Total Cost:	Unknown
Duration:	3 years (useful results can be obtained in 1 year; 3-year project is recommended to assess interannual variation in composition of forage fish stocks)
Geographic Area:	Naked Island, Smith Island, Porpoise Rocks, Wooded Islands, Chiswell Islands, Barren Islands
Injured Resource/Service:	Multiple resources

INTRODUCTION

Tufted puffins are widely distributed in breeding colonies throughout the *Exxon Valdez* oil spill area. During the chick-rearing period, adults make several trips daily to the nesting burrow, carrying fresh prey to their young. By intercepting those food deliveries, it is possible to sample the nestling diet of puffins systematically and nonconsumptively. Puffins are representative of seabirds (common murres, marbled murrelets, pigeon guillemots, black-legged kittiwakes and others) that rely in summer on a common food base consisting of forage species like capelin, sandlance and smelts, and the juveniles of commercially important species such as pollock, herring, and salmon. This project will use puffin diet sampling as a means to quantify seasonal, annual, and geographic variation in the composition of the forage fish community at selected stations within the spill area. The project will complement traditional, more costly approaches involving hydroacoustics and net sampling and will also provide a reliable source of seabird prey specimens for laboratory analysis.

NEED FOR THE PROJECT

Three species of marine birds (common murre, marbled murrelet, and pigeon guillemot) and one pinniped (harbor seal) were injured by the *Exxon Valdez* oil spill and are not recovering. An additional species (black-legged kittiwake) showed early effects on reproduction (comparing oiled and unoiled areas) and has experienced widespread breeding failure throughout Prince William Sound in the last two years. The summer diets of these and other members of the pelagic community of vertebrate predators (birds, mammals, and fish) are known to overlap. One hypothesis to explain the failure of recovery of injured species is that adverse changes are occurring in the quantity or quality of these species' prey. To test that hypothesis, it is necessary to quantify the status and trends of prey populations, particularly the forage fish that comprise an important part of the summer diet. Few data are available on the distribution and abundance of forage fish, because most species are not commercially harvested, and traditional methods of fishery science tend to be difficult and expensive. In the Gulf of Alaska, tufted puffins have proved to be excellent samplers of the forage fish community, providing annual indices of the distribution and relative abundances of keystone species such as capelin, sandlance, pollock, myctophids, and squids. Conducted over a span of years, this approach offers a cost-effective means of monitoring key components of the pelagic ecosystem and testing the hypothesis that recovery of marine birds and mammals is influenced by changes in the composition of marine fish stocks.

Seabirds in general, and puffins in particular, may constitute an important mortality factor on the early life stages of commercially important species. In the Gulf of Alaska, Hatch and Sanger calculated that tufted puffins took 11 billion pollock from mid July to mid September, roughly one-tenth of the first-year juveniles available just prior to chick-rearing and ten times the number of fish surviving to the following March. On the Barren Islands in 1993, puffins frequently delivered juvenile sockeye salmon, although the smolt were too large to be readily ingested by the chicks, and many went to waste.

Whether seabird predation proves to be a significant source of mortality or not, previous results suggest that diet sampling can provide an early indication of year-class strength in some species. For instance, the proportion of pollock in tufted puffin diets at the Semidi Islands (western Gulf of Alaska) was strongly correlated over three years with independent measures of year-class strength obtained in fishery investigations. A similar outcome might be obtained for sockeye salmon at the Barren Islands or pink salmon in Hinchinbrook Entrance to Prince William Sound, where an out-migration of juveniles in late summer and fall would encounter the sizeable puffin colonies on Porpoise Rocks and the Wooded Islands.

Because puffins deliver whole, undamaged prey to their chicks, this project can serve as a ready source of specimens for determination of prey quality (composition and energy density), population structure (age-sex ratios, genetic stock identification), and trophic studies (fish stomach contents, stable isotope ratios and/or lipid analysis). Puffin samples have also been used to estimate daily growth increments of juvenile sandlance and pollock.

PROJECT DESIGN

A. Objectives

1. Annually assess the species composition of the forage fish community near selected colonies of seabirds in the northern portion of the *Exxon Valdez* oil spill area.

2. Cross check the species composition of forage fish as determined by puffin diet sampling and hydroacoustic/net sampling techniques.

3. Assess the timing and magnitude of puffin predation on commercially important prey species including Pacific herring, pink salmon, and sockeye salmon.

4. Furnish whole prey specimens on demand for complementary studies of prey energetics, food web relationships, and fish population characteristics.

B. Methods

Puffin diet samples are collected most efficiently by placing wire screens over the entrances to burrows. Unable to enter, returning adults frequently drop their food loads on or near the screens, which are removed when the samples are retrieved after 1-3 h. Samples are washed, bagged and preserved for later analysis in the laboratory. Any temporal sampling design that may be desired can be implemented, but for maximizing the quantity of food obtained, morning hours tend to be most productive because puffins generally make a food delivery soon after first daylight.

One issue raised by this sampling approach is whether puffins take different types of prey in proportion to their relative abundances in the water column. Therefore, a desirable element of the field work during the first year of this project would be a comparison of the results from puffin diet sampling with simultaneous deployment of hydroacoustics and net sampling offshore at one or more colonies. The offshore work is not budgeted for in this proposal, but it is anticipated that the coordinated study would be achieved through cooperation with other projects (forage fish assessment or SEA plan) proposed for fiscal year 1995.

Puffin productivity (chicks per burrow surviving at a late stage of the breeding season) and breeding chronology (estimated from chick wing lengths) will be monitored at little or no additional cost in each of the study colonies.

C. Schedule

Fiscal Year 1995

Nov-June	Establish contracts, recruit personnel, safety training, boat and collection equipment preparation.
July-Aug	Field collection of puffin diet samples at six sites in Prince William Sound and northern Gulf of Alaska; coordinated investigation of sampling methods at Porpoise Rocks.
Sept	Laboratory analysis of food samples.

Fiscal Year 1996

Oct-Dec	Complete laboratory analysis; data analysis and report writing.
Jan	Draft annual report.
March	Final annual report.

D. Technical Support

Prey samples may be identified and measured under contract to the University of Alaska or a private consultant.

E. Location

The Porpoise Rocks colony in Hinchinbrook Entrance is strategically located relative to juvenile salmon migration. It is probably also the best location for a comparative study of sampling techniques. Additional colonies in Prince William Sound would include Naked Island, Smith Island, and the Wooded Islands. Outside the Sound, but in the path of the oil spill, colonies of first choice include the Chiswell Islands and Barren Islands. There is some question whether puffin habitat on the Chiswells is sufficiently accessible; if not, at least one alternative site would be worked along the Kenai Peninsula or in the Kodiak Island area.

PROJECT IMPLEMENTATION

This project will be implemented by the Alaska Science Center, National Biological Survey. Center personnel developed the field techniques proposed for puffin diet sampling and have successfully applied the methods at more than 20 puffin colonies in the Gulf of Alaska since 1985.

COORDINATION OF INTEGRATED RESEARCH EFFORT

As previously noted, coordination with offshore operations that sample forage fish by traditional methods is a highly recommended component of this project. The project will contribute to and draw upon SEA investigations of juvenile salmon and herring, and will use information on physical oceanography generated by other EVOS funded studies in the interpretation of seasonal, annual, and geographic variation in forage fish communities.

FY 95 BUDGET ($K)

Personnel	138.1
Travel	20.6
Contractual	21.6
Commodities	10.8
Equipment	58.0
Subtotal	249.1
Gen. Admin.	22.2
Total	271.3

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Seasonal Movements and Pelagic Habitat Use by Common Murres from the Barren Islands

Project Number:	95021
Restoration Category:	Research (new)
Proposed By:	National Biological Survey
Lead Trustee Agency:	DOI
Cost FY 95:	$230,900 (includes data analysis and report writing costs)
Cost FY 96:	$221,100 (includes data analysis and report writing costs)
Total Cost:	$452,000
Duration:	2 years (useful results can be obtained in 1 year; 2-year project is recommended to assess interannual variation in the foraging behavior of common murres)
Geographic Area:	Barren Islands
Injured Resource/Service:	Common murre

INTRODUCTION

Small (30 g) satellite transmitters have recently become available for use in wildlife telemetry. These implantable devices are proven effective when deployed on birds in the size range of common murres, i.e., about 1 kg. In this project, satellite transmitters will be surgically implanted in a sample of murres from the Barren Islands to determine both the summer feeding areas and wintering areas of birds from this heavily impacted colony. This information will be vital for designing and optimizing an investigation of food availability to murres and for testing the hypothesis that food limitation is constraining the recovery of the Barren Islands population following the *Exxon Valdez* oil spill.

As diving birds, murres do not access the entire water column uniformly, but concentrate their foraging activity in depth ranges dictated by the distribution of their preferred foods and limitations imposed by their own diving physiology. This additional information is needed to address the question of food limitation on murre productivity and recovery. Externally mounted depth recorders will be used to determine the average time-at-depth for common murres foraging in the vicinity of the Barren Islands.

NEED FOR THE PROJECT

Common murres were among the vertebrate species most seriously injured by the *Exxon Valdez* oil spill. About 75% of the 35,000 bird carcasses recovered during and shortly after the event were murres, and estimates of murre losses were in excess of 100,000 individuals. After the oil spill, fewer breeding murres were found at the Barren Islands compared to historical data, and annual censuses have not detected any recovery in numbers. Also, based on data from Nord Island, production of chicks was almost zero in both 1989 and 1990, and still low in 1991 and 1992 compared to colonies outside the spill zone.

One hypothesis to explain the failure of recovery in common murres is that food availability is limiting the ability of birds to breed successfully or to survive in sufficient numbers during the nonbreeding season. An evaluation of that hypothesis requires that we identify the principal feeding areas of murres in both seasons and design appropriate oceanographic studies to assess the factors affecting food availability. Telemetry offers a more cost-effective approach for determining foraging patterns and habitat use than is possible using traditional survey methods.

In many populations of seabirds, the majority of natural mortality occurs during the winter months. Problems with the food supply on the wintering grounds may constrain the recovery of Barren Islands murres even if productivity improves. Probably there is another critical period in fall, when recently fledged young make the transition to self-feeding. However, the existence or location of possible "nursery areas" is all but unknown for this and other populations of seabirds.

Through the combined use of satellite transmitters and time-depth recorders, this project will provide a three-dimensional view of murre foraging patterns around the Barren Islands in summer. Additionally, transmitters deployed in fall and tracked through the winter months will reveal the primary wintering areas used by this population. It may also be possible to locate key foraging areas of juvenile murres by deploying transmitters on breeding males late in the season. Flightless murre chicks are led to sea by their male parents, who continue to provide parental care for several weeks as the young learn gradually to feed themselves.

PROJECT DESIGN

A. Objectives

1. Determine the foraging range and primary feeding areas of common murres from the Barren Islands, including assessment of individual and temporal variation.

2. Locate important nursery and/or wintering areas of common murres from the Barren Islands and determine the timing of use of those critical habitats.

3. Obtain average time-at-depth profiles for a sample of foraging murres from the Barren Islands.

B. Methods

Murres will be captured with poles and nooses during incubation and chick-rearing periods in the Lighthouse Rock portion of the colony on East Amatuli Island. Transmitters will be surgically implanted by a qualified veterinarian. The ARGOS Data Collection and Location System will be used to track the movements of instrumented birds. Transmitters will be programmed to emit signals on one of two duty cycles: (1) continuous transmission, providing frequent information on locations (accurate to $\leq$ 1 km) over a 3-week period (expected battery life), or (2) low-interval transmissions (e.g., 6 h every 3 days) for less frequent position data over the course of an annual cycle (52 weeks). Position data will be mapped using CAMRIS (Computer Aided Mapping and Resource Information System) or other suitable GIS software.

Time-depth recorders are relatively inexpensive devices employing hypodermic syringes and photographic film to record the depth-dependent position of an light-emitting diode). The instruments are attached externally to the dorsal feathers and must be retrieved after an appropriate interval to obtain the data on diving depths. Information on the depth and duration of dives is cumulatively recorded on the film, and the exposed film is analyzed using a densitometer. Each unit is calibrated prior to deployment. LED depth recorders have been used successfully with thick-billed murres in the Canadian Arctic and on smaller alcid species in the North Pacific.

C. Schedule

Fiscal Year 1995

Nov-June	Establish contracts, recruit personnel, procure satellite transmitters and LED depth recorders.
July-Aug	Field operations at East Amatuli Island, begin data acquisition via ARGOS.
Sept	Continue ARGOS data acquisition, densitometer readings and interpretation of LED depth recorder films.

Fiscal Year 1996

Oct-Dec	Continue ARGOS data acquisition, data analysis and report preparation.
Jan	Draft annual report.
March	Final annual report.

D. Technical Support

The manufacture, calibration, and optical density measurements of LED depth recorders will be contracted to a qualified specialist. This project also requires the services of an experienced veterinarian and access to the ARGOS data-logging and distribution system, both of which are available in the Alaska Science Center of the National Biological Survey.

E. Location

These studies will be carried out in the colony at the north end of East Amatuli Island, the more accessible of two colonies of common murres in the Barren Islands.

PROJECT IMPLEMENTATION

The project will be implemented by the Alaska Science Center, National Biological Survey. In addition to the in-house technical support mentioned above, Center personnel have unique experience with implantable satellite transmitters for recording the movements of birds at sea. The Principal Investigator for this project has scheduled a pilot study of transmitter implants and satellite tracking of common murres in the Gulf of Alaska during July 1994.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Work on East Amatuli Island will be coordinated with the monitoring study of common murres proposed for that site to facilitate the telemetry study and avoid any conflicts between the two. Results of this study should be used in planning future investigations of the food limitation hypothesis as it pertains to common murres.

FY 95 BUDGET ($K)

Personnel	107.3
Travel	9.6
Contractual	10.5
Commodities	22.9
Equipment	63.8
Subtotal	214.1
Gen. Admin.	16.8
Total	230.9

Food Web Relationships of Pelagic Species Exhibiting Long-Term Decline

Project Number:	95023
Restoration Category:	Research (new)
Proposed By:	Alaska Natural Heritage Program, UAA
Lead Trustee Agency:	DOI
Cost FY 95:	$133,200
Cost FY 96:	$170,000
Total Cost:	Unknown
Duration:	3 years (useful results can be obtained in one year; 3-year project is recommended to assess the effects of interannual variation on the diets of the species in the study and to develop a model of trophic interactions of Prince William Sound)
Geographic Area:	Prince William Sound and adjoining portions of the oil spill area
Injured Resource/Service:	Common murre, marbled murrelet, pigeon guillemot

INTRODUCTION

This project will look at the food webs of Prince William Sound, focusing on diets of seabirds damaged by the *Exxon Valdez* oil spill, the common murre, marbled murrelet, pigeon guillemot and several other seabirds selected for their utility as environmental samplers. Diets will be examined in relation to those of Pacific herring and other forage fish and to the predatory fish such as Walleye pollock that might interact with either the birds, as competitors, or the forage fish, as competitors or predators.

We will use historical data from published studies and from stable-isotope analysis of existing specimens if possible to compare with data gathered during through subprojects of this one, from other EVOS studies, and from recovery of carcasses of animals found dead.

These data will be used to develop simple carbon-flow models to examine the relative importance of different pathways between decades and between areas and to compare these pathways with what is known of changes in the populations of EVOS-injured species and other ecosystem indicators.

NEED FOR THE PROJECT

Marine ecosystems can fluctuate and, in the North Pacific, they vary at a wide variety of scales that affect seabirds and other marine organisms. This variability can enhance, retard or obscure the effects of single events such as the spill of the *Exxon Valdez* in Prince William Sound, Alaska. For example, resources that were damaged by the oil spill may not have recovered because of climatic variability that rendered the environment less favorable or there may be lingering effects of the spill that might be open to amelioration. Reductions in some species might trigger increases in their prey that then in turn compete with third species, preventing their recovery.

We can not address these or other possibilities concerning recovery or manage Prince William Sound as an ecosystem unless we understand the existing trophic networks that operate within the ecosystem. While understanding an entiretrophic structure of the Sound is an open-ended project that would require years, if not decades, we can test hypotheses and develop models centering on injured resources that should help give us a working knowledge of how the trophic networks function, sufficient to allow us to assist the restoration process or, in the very worst case, at least to understand the magnitude of the task.

PROJECT DESIGN

The project will run for three years, to test interannual variability. The first year will involve collection of historical data and synthesis of data from ongoing studies. The second year will continue data collection and the initial modelling exercise. The third year will see refinement of the model and testing of its predictions through limited field work.

The project will have two sampling components and analysis methods to provide the data for model construction. For examination of trophic interactions at short-terms over small scales, we will undertake analysis of diet through classical diet analysis techniques. We will collect diets through direct field work by research collaborators and ourselves. To get a larger-scale picture of trophic interactions, we will use our own collections and public salvage of specimens for stable-isotope analysis of the trophic levels of constituent species.

We will then use either carbon-flow, biomass, trophic level models), or spatial/oceanographic approaches to modelling the food web.

A. Objectives

1. Define the food web relationships of key species in the pelagic ecosystem of Prince William Sound and adjacent portions of the spill zone.

2. Assess seasonal, annual, decadal and regional variation in the diets of injured species of marine birds (common murre, marbled murrelet and pigeon guillemot) and selected indicator species including tufted puffins and black-legged kittiwakes that may serve as monitors of the ecosystem.

3. Test the null hypotheses that 1) no changes in diet occurred cohesively among several species between decades; and that 2) interannual variability in diet does not occur at a scale that might obscure interdecadal change. If the null hypotheses can be rejected, we will test the overall project hypothesis that Prince William Sound has shifted from a pelagic to a demersal ecosystem in terms of fish production.

4. Synthesize information on trophic dynamics in Prince William Sound and the northern Gulf of Alaska and derive a model or models of species interactions that predict the relative importance of competition and predation on the recovery of injured species.

B. Methods

1. The project will coordinate with other studies in the marine bird program. It will use diet data on food habits collected using nonconsumptive techniques in other projects. We will undertake fieldwork to fill in any gaps in coverage. We will provide technical assistance on stomach pumping to increase the use of non-lethal sampling and will coordinate efforts to ensure complete coverage.

2. The project will encourage widespread efforts by the public and governmental agencies to collect carcasses of birds found dead (washed up, dead in fishery operations, etc).

3. The project will undertake stable isotope analysis using material from dead birds recovered as above, from stomach contents derived from nonlethal sampling of birds, and from forage and predatory fish from fishery operations and from the SEA Plan.

4. Diet contents will be assigned to broad trophic levels or guilds and analyzed for spatial and temporal variation and for congruence in diet and diet change between species. Carbon flow models for different areas and decades will be constructed. We will then examine known or inferred changes in populations of the constituent species (temporal change) and relative abundance of species (geographic variation) that might represent transitions between the different carbon models.

5. We can test spatial predictions of models by sampling in new areas in the third year. Temporal predictions may be more difficult to test unless significant climatic or other change can be detected independently.

C. Schedule

Fiscal Year 1

Oct-Apr	Establish contracts, set up public involvement process for collecting of specimens training for field sampling, preparation for field work.
Feb-Mar	Undertake winter sampling.
Feb	Begin public collection process and analyze specimens as they become available.
June-Aug	Field work in Prince William Sound and adjacent spill areas.
Sept	Analyze data from collaborators as they become available. Initial report completed.

Fiscal Year 2

Oct-Dec	Continue analysis of specimens from public salvage efforts and from own field work and collate data from collaborators. Initial scoping effort to determine most effective models relative to available data.
Jan	Prepare report on first field season; town meetings on results in Anchorage, Valdez and Seward. Begin modelling exercise.
Feb-Mar	Undertake winter sampling.
May	Prepare for summer sampling.
May-Sept	Continue analysis of specimens from public salvage efforts, undertake own field work and collate data from collaborators.
June-Aug	Field work in Prince William Sound and adjacent spill areas.
Sept	Second-year report completed.

Fiscal Year 3

Oct-Dec	Continue analysis of specimens from public salvage efforts and from own field work and collate data from collaborators.
Jan	Prepare report on second field season; town meetings on results in Anchorage, Valdez and Seward. Continue modelling, integrating second year's data.
Feb-Mar	Undertake winter sampling.
May-July	Limited final field work in Prince William Sound and adjacent spill areas to test model predictions or gather missing data.
July-Aug	Final analysis of data, running of final model and preparation of report.

D. Technical Support

A stable-isotope laboratory and a lipid laboratory will be involved in the project in the first year. Based on initial results, their roles will be determined for the second two years. Field work will be conducted on private vessels and collection of specimens of organisms found dead in the Prince William Sound area will require support from management and regulatory agencies (U.S. Fish and Wildlife Service, Alaska Division of Fish and Game, U.S. Coast Guard, local police) and nongovernment groups (Native Corporations, fishermen and anglers). Collection of samples will be coordinated with other EVOS-funded researchers and any others active in the area. Modelling efforts in the second and third year may require additional participants.

E. Location

Prince William Sound and adjacent portions of the spill area. Particular locations will be determined by work by cooperating scientists and by specimens contributed by the public. Our field work will be directed at filling in geographic 'gaps' in coverage in the first two years. In the third year, we will use field work to test model predictions in a previously unsampled area.

PROJECT IMPLEMENTATION

Project will be managed by the Alaska Natural Heritage Program (AKNHP), with field work and data collection by personnel from AKNHP, National Biological Survey, and other agencies. AKNHP have extensive experience coordinating projects involving multiagency efforts. AKNHP is also by mission and experience able to handle and integrate data from diverse sources, as will be required for this project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will rely heavily on coordination and cooperation with other researchers who will collect data on diets as parts of their own studies. Initial mechanisms for coordination stem from the scientific planning meeting of the Oil Spill office in April. Further coordination would be an integral part of the overall marine bird project. Also we plan to rely on provision of carcasses found by the public (fishermen, beachcombers, tourist operators) and by various state and federal agencies. This will be achieved by site visits, town meetings, use of media, and extensive communication with appropriate governmental and other agencies.

FY 95 BUDGET ($K)

Personnel	52.0
Travel	21.0
Contractual	35.0
Commodities	10.0
Equipment	5.0
Subtotal	123.0
Gen. Admin.	10.3
Total	133.2

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Enhancement of Prince William Sound Wild Salmon Stocks

Project Number:	95024
Restoration Category:	General Restoration (new)
Proposed By:	Village of Eyak
Lead Trustee Agency:	ADFG
Cost FY 95:	$184,000
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	10 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon, subsistence, commercial fishing

INTRODUCTION

Wild stocks of pink and chum salmon in many Prince William Sound streams have been at severely depressed levels for many years despite fishery closures. Recovery of these salmon stocks was adversely affected by the oil spill either directly or when fry outmigrated through oiled areas. These wild stocks of salmon have been the basis of a subsistence way of life for the native people for thousands of years. Since these stocks are not recovering, a project to rehabilitate and restore wild pink and chum salmon is proposed.

The general consensus of opinion of the residents of Prince William Sound effected by the oil spill is that the results of all the money spent on "restoration studies" thus far proposed will be another large library and employment for experts from unaffected areas. Studies usually have a net negative effect on the subject population. When all of the money has been spent, both the area resources and access to those resources by the dependent human population will be reduced.

This proposal is designed to rehabilitate rather than study depressed populations of wild pink and chum salmon as well as the subsistence, commercial, and recreational fisheries dependent on those populations. This will be accomplished using established fish culture techniques which when properly implemented have proven successful. Existing and proposed studies will benefit from this project by their being provided with known populations of pink and chum salmon as well as access to the logistical support necessary to accomplish the project.

Local hire will supply most of the professional, technical, training and logistical services required to implement this project. This will provide employment options to some of those most severely impacted by the oil spill.

NEED FOR THE PROJECT

This project will aid in the restoration of wild pink salmon (noted by EVOS as a non-recovering biological resource), wild chum salmon, and the subsistence fishery (noted by EVOS as a lost or reduced service).

The restoration of the subsistence fishery by those most affected and the jobs created by this project will create hope for the future. This could help alleviate the increase in divorce, domestic violence, alcoholism, and other social ills caused by the cultural disruption and economic desperation due to the oil spill.

PROJECT DESIGN

A. Objectives

1. The first phase of the project will be to identify which streams in Prince William Sound have been below minimum ADFG escapement goals for three generations (two generations for chum salmon) but which have a remnant population that can be used as an egg source. Special emphasis will be placed on streams with a previous history of good production where the limiting factor is inadequate escapement. This task can be accomplished by review of existing ADFG records.

2. Phase two of the project will involve site surveys to determine its suitability for streamside incubators and netpen rearing sites.

3. Phase three will involve the installation of streamside incubators and the negotiation of agreement with existing hatchery operators for the remote incubation of salmon eggs from the candidate streams.

4. Phase four will be the actual fish culture portion including: eggtakes, egg and fry transportation, incubation, marking, and pen rearing of fry to achieve optimum survival rates.

5. The final phase will be the evaluation of the adult returns to determine if the objectives of the project are being met.

B. Methods

Depressed stocks of wild pink and chum salmon will rehabilitate in selected Prince William Sound streams by a combination of three techniques:

1. Streamside incubators will be installed where suitable conditions exist.

2. Eggs will be collected from candidate streams, incubated at an existing hatchery facility and returned to their native stream for release.

3. Pen rearing will be utilized in some instances to increase survival rates by releasing larger fry. This technique can also be used to hold early emergent fry so they can be released when zooplankton populations are conducive to maximum survival.

Eggtake, incubation, marking, fry transport, and rearing operations will be conducted using techniques that have proven successful in previous Prince William Sound fish culture programs.

C. Schedule

A detailed schedule of activities will be provided with the work plan.

D. Technical Support

With the exception of the services of the ADFG pathology and mark recovery labs most of the technical support will be provided by the proposer.

E. Location

Prince William Sound. The communities affected are Cordova, Tatitlek, Valdez, Whittier and Chenega.

PROJECT IMPLEMENTATION

This project is proposed by the native village of Eyak Tribal Council which has interest in the health of the salmon resource and the subsistence fishery it supports.

COORDINATION OF INTEGRATED RESEARCH EFFORT

It will be necessary to develop a working relationship with the Alaska Dept. of Fish and Game, U.S. Forest Service, Village of Tatitlek, Chenega Bay, and the private aquaculture operators in Prince William Sound.

FY 95 BUDGET ($K)

Personnel	6.7
Travel	0.0
Contractual	164.8
Commodities	0.0
Equipment	0.0
Subtotal	171.5
Gen. Admin.	12.5
Total	184.0

Factors Affecting Recovery of Sea Ducks and their Prey

Project Number:	95025A
Restoration Category:	Research (new)
Proposed By:	DOI
Cost FY 95:	$415,100
Cost FY 96:	$307,800
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Harlequin duck

INTRODUCTION

Sea ducks are an important avian component of the nearshore ecosystem of Prince William Sound, particularly in winter. During March 1972 - 1991, sea ducks constituted 36% of birds observed from Prince William Sound boat surveys. The sea duck community is composed of a diverse assemblage of species, including harlequin ducks (*Histrionicus histrionicus*), Barrow's (*Bucephala islandica*) and common (*B. clangula*) goldeneyes, white-winged (*Melanitta fusca*), surf (*M. perspicillata*), and black (*M. nigra*) scoters, oldsquaw (*Clangula hyemalis*), buffleheads (*B. albeola*), and mergansers (*Mergus* spp.).

Sea duck studies are an appropriate use of restoration funds both because sea ducks were injured by the EVOS and because they affect populations of other injured organisms on which they prey. Sea ducks reside in nearshore habitats, where continuing oil contamination is likely. Harlequin duck populations in the oiled zone of Prince William Sound were documented as injured by the EVOS; harlequins are classified as an injured resource. Some evidence of injury to scoters and goldeneyes in the oiled zone was documented by marine bird surveys. The surveys also documented extreme Sound-wide declines of scoters in the two decades preceding the spill. These species were not studied individually during the Damage Assessment process; given the reliance of sea ducks on nearshore habitats that retained oil, it is probable that such studies would have documented further injury. In addition, sea ducks prey on intertidal and shallow subtidal organisms, such as mussels. These prey organisms were classified as injured resources. It is possible that continuing predation by sea ducks is limiting recovery of these organisms.

Wintering biology and ecosystem interactions of sea ducks are poorly known. Most ecological studies of wintering sea ducks are from Europe or the Atlantic coast). While some work has been done in the Pacific with sea duck winter foraging, only two winter studies have been conducted in Alaska, neither in Prince William Sound. Most aspects of sea duck wintering biology have not been addressed. For example, it is possible that harlequin duck breeding and winter populations in Prince William Sound are comprised of the same individuals. The Restoration Strategy should include winter studies to examine the possibility that breeding harlequins are failing due to continued contamination or food shortage throughout the winter.

An intensive study of sea duck wintering ecology and ecosystem interactions would serve to elucidate factors that limit populations and may be influencing recovery of injured species and systems. This study is comprised of two related components: survival and movements, and foraging ecology of wintering sea ducks.

NEED FOR THE PROJECT

Survival and movements: Overwinter survival of sea ducks in Prince William Sound likely has important, direct effects on annual population dynamics and specific annual variation of wintering numbers in Prince William Sound. Factors that are influencing survival must be understood to identify processes limiting recovery of injured species and systems. Through incorporation of estimated survival rates into population dynamics models, sustainability of populations can be determined.

Sea duck survival is a good measure of the health and productivity of the nearshore system. Sea ducks rely on intertidal and shallow subtidal areas for foraging. Disturbances of these habitats and the invertebrate prey inhabiting them likely directly affect benthic foragers like sea ducks.

Condition and foraging ecology: The foraging ecology component will address several concerns related to restoration of sea ducks and their prey. These concerns include whether (1) trophic interactions, competition, food availability, or food quality are limiting recovery of sea ducks, (2) injured benthic invertebrates are not recovering because they are important sea duck food items, or (3) oil continues to be ingested and/or accumulated by sea ducks.

Herring eggs might be an important food for sea ducks in late winter. Spring condition has important implications for subsequent reproductive performance in many waterfowl species.

PROJECT DESIGN

A/B. Objectives and Methods

1. Identify major causes of sea duck mortality and limiting effects of winter survival for sea duck recovery.

2. Examine whether trophic interactions, competition, food availability, or food quality are limiting recovery of sea ducks.

3. Identify major sea duck prey species, so that related studies of injured benthic invertebrates can evaluate whether those species are not recovering because they are important sea duck food.

Survival and Movement

Objectives. In Prince William Sound, there are several potential sources of sea duck winter mortality including harvest, starvation or exposure, predation, disease, and exposure to contaminants, including residual oil. To identify causes of mortality and potential limiting effects of winter survival for recovery of species, we propose a study to measure survival and mortality sources in harlequin duck and Barrow's goldeneye females. The study would address the following questions:

- does overwinter survival limit population growth of sea duck species?
- what are sources of mortality? Is mortality higher in oiled habitats than unoiled habitats?
- what are frequency and distance of wintering sea ducks movements? Do they move among oiled and unoiled habitats?
- how are sea ducks distributed throughout the Sound?
- do harlequin ducks marked during fall and winter breed in Prince William Sound?

Methods. Sea ducks would be captured during fall by a variety of techniques, potentially including: driving molting flocks, net guns, rocket nets on roosting sites, mist nests, night-lighting, and capturing from underwater using scuba or rebreather technology. Females would be outfitted with radio-transmitters. Only females would be assessed because their survival dictates population dynamics. Capturing, marking, and tracking birds will be conducted cooperatively with Alaska Department of Fish and Game investigators studying harlequin ducks.

Transmitters equipped with mortality switches would be implanted in the body cavity with an external antenna. Surgeries would be conducted by a certified veterinarian. Radio telemetry flights would be conducted weekly through winter and early spring. Flights would locate each marked individual and note status, flock size, coordinates, and general habitat. For birds indicated as dead, the carcass would be recovered by boat or float plane as soon as possible. Collected carcasses would be examined for causes of mortality.

We propose analyzing existing data from boat-based marine bird population surveys conducted in March (1972-73, 1984-85, 1990-91, 1993) and aerial surveys conducted in March and October (1989-90) by the U.S. Fish and Wildlife Service to clarify winter distribution of sea ducks in the Sound. Combining survey data with existing information on shoreline type will also allow us to formulate hypotheses concerning habitat factors affecting distribution.

Condition and Foraging Ecology

Objectives: We propose a foraging ecology study that would assess variation in physiological condition and prey species of harlequin ducks, Barrow's goldeneyes, and white-winged scoters. Also, potential competition within the sea duck community and with other benthic foragers (e.g., sea otters) would be determined. The study would answer the following specific questions:

- does condition (as a measure of health) change through winter? Is condition related to habitat (including oiled vs. nonoiled)?
- what taxa and size classes of prey are sea ducks eating in the winter?
- does potential competition exist among benthic foraging predators (including sea ducks, sea otters, invertebrate predators) for food items of sea ducks?
- are prey species abundances linked to specific habitats, including oiled vs. unoiled habitats?
- does energy expenditure (as measured by foraging behavior) differ among habitats (including oiled vs. unoiled)?

Methods. We would assess condition and diets of female harlequin ducks, Barrow's goldeneyes, and white-winged scoters by collecting approximately 40 individuals of each species annually, for 2 or 3 seasons. Upon collection, the digestive tract would be dissected immediately, and contents of the esophagus, proventriculus, and gizzard would be preserved and stored separately. In the laboratory, foods would be sorted, identified, analyzed for oil, and their volume and dry weight measured. Body composition analysis would be conducted as described by Esler and Grand.

We would assess foraging behavior by observing marked birds for periods during which the proportion of time spent foraging would be measured. Time spent foraging during these periods would be measured either through continuous observations, or by sampling behavior instantaneously at pre-determined intervals (e.g. every 20 seconds). By identifying habitats used by focal birds at each sampling point, we would also quantify time spent foraging in different habitats.

C. Schedule

To adequately understand factors influencing sea duck populations and annual variation, a study of 5 years or longer should be initiated. Field work supported with FY95 funds would begin in fall 1994 and continue through March 1995. Annual reports would be completed by the winter following field work.

D. Technical Support

Contracts for laboratory work will be required for physiological condition and digestive tract content analysis, and for consultation with a statistician to insure appropriate analysis techniques are used.

E. Location

Prince William Sound, at study sites to be determined in conjunction with investigators studying sea otters and benthic invertebrate communities.

PROJECT IMPLEMENTATION

This project would be implemented by the Alaska Science Center of the National Biological Survey, and by the U.S. Fish and Wildlife Service. Personnel in these agencies have extensive experience studying population dynamics of waterfowl in Alaska.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This sub-project is a joint effort by biologists in two trust agencies (NBS and USFWS). Success of this project also relies on other investigators within the Nearshore Project collecting information on (1) prey abundance, size class, and distribution and (2) foraging ecology of other predators of benthic invertebrates such as sea otters, octopus or sea stars. We are in close contact with potential investigators of these projects, and with investigators of the harlequin duck breeding population. We plan to share proposals and results, and to realize cost-efficiencies by working at common field sites.

These studies of wintering sea duck ecology in Prince William Sound would be most valuable as concurrent, integrated investigations. For example, studies of foods and trophic interactions would identify possible food limitations and pathways for pollutants, and seasonal changes in condition. Survival studies are necessary to link these factors to risk and causes of mortality. Habitat studies could further advance our understanding by identifying underlying, proximate causes of variation in food, behavior, and condition that may affect survival.

FY 95 BUDGET ($K)

Personnel	165.4
Travel	8.0
Contractual	129.5
Commodities	12.0
Equipment	66.3
Subtotal	381.2
Gen. Admin.	33.9
Total	415.1

Sea Otter Abundance and Distribution, Food Habits and Population Assessment

Project Number:	95025B
Restoration Category:	Research (new)
Proposed By:	National Biological Survey
Lead Trustee Agency:	DOI
Cost FY 95:	$168,100
Cost FY 96:	$138,500
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Sea otter

INTRODUCTION

Sea otters are the most abundant of the Alaskan marine mammals affected by the *Exxon Valdez* oil spill (EVOS). They were hunted almost to extinction in the 17th and 18th century, but have since reoccupied most of their original range in Alaska, including areas in Prince William Sound (PWS). Otters play a major role in structuring the nearshore community through predation on nearshore marine invertebrates.

Sea otters were severely injured by the EVOS, with an estimated initial loss throughout the spill area of approximately 4000 animals. Sea otters in PWS suffered the greatest effects, and oil-related injury to the otters residing in western PWS appeared to persist through at least 1991. Although there is evidence that the health of the otters has improved since 1991, there is uncertainty about the status of recovery of sea otters in oiled areas. Specifically, concerns arise in regard to 1) relatively low densities and 2) poor survival of juvenile sea otters in western PWS. Survival rates of juveniles in western PWS were significantly lower than in non-oiled areas in both 1990-91 and 1992-93. However, survival rates for both areas improved in 1992-93 compared to 1990-91. Low densities of sea otters are observed in areas that were heavily oiled relative to lesser or non-oiled areas. For example, densities of sea otters around northern Knight Island and Naked Island are relatively low compared to the densities observed around Green Island. Factors (including oil effects) causing varying otter densities and juvenile survival rates are not understood. Availability of prey for sea otters may be a contributing factor.

Further concern over the health of sea otters in oiled areas arises from differences in blood values of sea otters living in oiled versus non-oiled areas of PWS. We have observed increased levels of blood serum enzymes indicative of liver disorders (ALT, GGT), and white cells (eosinophils) that may be related to subclinical disease from oil exposure. The increased levels of serum enzymes are consistent with changes observed in oiled otters exhibiting kidney and liver pathologies at the rehabilitation centers. The differences between otters in oiled and non-oiled areas persisted through 1992; no blood samples have been collected since then.

This project is a component of an integrated effort to examine recovery of injured species in the nearshore ecosystem. We address the status of recovery of sea otters in PWS and the interactions among sea otters and other species in the nearshore community that have potentially been injured by oil exposure. Specific accomplishments of this project will include evaluation of 1) the extent of recovery, 2) factors contributing to differences in densities, 3) health and condition, and 4) food habits of sea otters among areas in PWS that vary in oiling and in densities of otters.

Sea otter studies previously funded by the Trustees include NRDA Marine Mammal Studies #6 & #7, and Restoration Project 93043, conducted on sea otters in PWS from 1989 through 1994. This project represents a logical continuation of certain elements of those studies.

NEED FOR THE PROJECT

This project will 1) monitor recovery of sea otters through the collection of data on the abundance and distribution, 2) assess possible chronic effects of oil exposure on sea otters in oiled areas of PWS, and 3) enhance our understanding of the role that sea otters play in structuring nearshore communities that have been impacted by the EVOS. Information will be obtained on factors limiting recovery of sea otters and on alterations in the nearshore community affected by or affecting sea otters.

PROJECT DESIGN

This project has 3 elements:

1. Surveys: to evaluate abundance, distribution, reproductive rates, and mortality.

2. Health and Condition: to evaluate sea otter body condition and health and possibly hydrocarbon burdens (if warranted, based on shellfish and sediment hydrocarbon results).

3. Food Habits: to evaluate the role of sea otters as a top-level predator in the nearshore community.

A. Objectives

1. Surveys
   a. Monitor sea otter recovery: conduct a survey of sea otter abundance and distribution in PWS.
   b. Conduct seasonal surveys of sea otter abundance and distribution at specific study sites.
   c. Conduct a survey of sea otter reproductive rates, based on ratios of pups to adults.
   d. Quantify age distribution of sea otters dying over the winter at Green Island.

2. Health and Condition
   a. Assess body condition of sea otters.
   b. Assay markers of immune function in sea otters.
   c. Collect fat tissue samples for potential analyses of hydrocarbon levels.

3. Food Habits
   a. Quantify prey selection and foraging efficiency of sea otters at specific study sites.

B. Methods

Study sites will be selected based on discussions with other investigators in the integrated nearshore ecosystem project. We anticipate identifying up to 4 sites in PWS to be the focus of this project.

1. Surveys

   a. PWS-wide aerial survey (methods as developed under Restoration Study # 93043) of distribution and abundance, summer 1995. This element of the project is for monitoring recovery.
   b. Site-specific aerial surveys of distribution and abundance, quarterly (spring, summer, fall, winter 1995).
   c. Boat-based survey of relative abundance of adults and pups, to estimate reproductive rates. The ratio of the number of pups to adults will be estimated and compared to existing data on pre- and post-spill ratios.
   d. Carcass recovery - survey Green Island shorelines in early spring to recovery beach-cast carcasses, and estimate age at death from reading of premolar tooth.

2. Health and Condition
   a. Capture sea otters at study site - collect body measurements (weight, length, and girth), blood, fat biopsy for possible hydrocarbon analysis, premolar tooth to estimate age; and flipper-tag otters with unique color-coded tags to allow identification of individuals.
   b. Evaluate immune function through 1) B & T cell activities, including levels of IGG, IGE, IGA, and IGM as indicators of humeral immunity, and 2) blast transformation assays to measure T-cell activities. Laboratory work to be done in cooperation with Dr. Alan Rebar at Purdue University.
   c. Evaluate blood CBC's and chemistries - laboratory work to be done by PML laboratories.

3. Food Habits

Observations of foraging behavior at study sites (observe all otters present, with preferential collection of data on flipper-tagged individuals when possible). Data to include prey items, prey sizes, # prey recovered/dive and dive times. Foraging data to be collected twice, in late winter and late summer of 1995.

C. Schedule

TIME	ACTIVITY
FALL 1994	1. DEVELOP DETAILED STUDY PLAN - WORKING IN CLOSE CONJUNCTION WITH OTHER INVESTIGATORS TO MAXIMIZE EFFICIENCY OF DATA COLLECTION 2. PERMIT APPLICATION - OTTER CAPTURE
SPRING 1995	1. CARCASS RECOVERY - GREEN ISLAND 2. SITE SPECIFIC SURVEYS OF DISTRIBUTION AND ABUNDANCE
SUMMER 1995	1. SURVEY OF DISTRIBUTION AND ABUNDANCE - ALL PWS 2. SITE SPECIFIC SURVEY OF DISTRIBUTION AND ABUNDANCE 3. OTTER CAPTURE AT SPECIFIC SITES 4. FORAGING OBSERVATIONS AT SPECIFIC SITES
FALL 1995	1. SITE SPECIFIC SURVEY OF DISTRIBUTION AND ABUNDANCE
WINTER 1996	1. SITE SPECIFIC SURVEY OF DISTRIBUTION AND ABUNDANCE 2. FORAGING OBSERVATIONS AT SPECIFIC SITES
SPRING 1996	1. COMPLETE DATA ANALYSIS AND WRITE REPORTS ON 1ST YEAR WORK 2. CARCASS RECOVERY - GREEN ISLAND
SUMMER 1997	1. SURVEY OF DISTRIBUTION AND ABUNDANCE - ALL PWS

D. Technical Support

The primary need for technical support is integration of data collected on other components of the Nearshore Ecosystem project with data collected on sea otters.

E. Location

The project will be conducted in western PWS. Communities that will be involved or affected include New Chenega (may provide a base for winter operations), Cordova and Whittier. The extent of involvement of these communities will depend on finalizing the project design, in coordination with other investigators, to identify specific study sites.

PROJECT IMPLEMENTATION

This component of the Nearshore Ecosystem project will be implemented and overseen by staff of the sea otter project, Alaska Science Center (ASC), NBS. Most of the equipment needed for project activities outlined herein is already owned by the ASC.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be a component of and will coordinate closely with other projects in the Nearshore Ecosystem project.

FY95 BUDGET ($K)

Personnel	46.7
Travel	15.0
Contractual	75.4
Commodities	10.7
Equipment	8.0
Subtotal	155.8
Gen. Admin.	12.3
Total	168.1

Pigeon Guillemots and River Otters as Bioindicators of Nearshore Ecosystem Health in Prince William Sound

Project Number:	95025C
Restoration Category:	Research (new)
Proposed By:	Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska Fairbanks
Lead Trustee Agency:	DOI
Cost FY 95:	$189,200
Cost FY 96:	$189,200
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pigeon guillemot, river otter, intertidal organisms

INTRODUCTION

This study is relevant to EVOS ecosystem research because it is designed to develop a better understanding of how petroleum hydrocarbon pollution affects the nearshore marine environment in Prince William Sound (PWS). Results from this study will allow us to test biostatistical models that predict ecosystem health and environmental deterioration. Use of bioindicators will lead to a better understanding of ecosystem processes in PWS. Our proposal describes a research approach for assessing the biological and ecological significance of contaminants present in the environment. In this research our focus is the pigeon guillemot (*Cepphus columba*) and river otter (*Lutra canadensis*) as indicators of environmental stress.

The guillemot and river otter models will be used as upper trophic level sentinels of bioavailable contaminants, such as oil, and as surrogates to estimate the potential exposure and risk to other organisms that are components of the PWS nearshore ecosystem. This research approach utilizes biomarkers (biochemical and cellular indicators of exposure), reproduction rates, and data on mortality to identify and quantify the present level of variability within the PWS ecosystem. This approach is necessary because evaluation of the potential for exposure to contaminants in the environment is extremely complex due to the differences in the biological availability of contaminants at different trophic levels and varying toxicological interactions within exposed organisms.

Focusing on the biological responses in indicator species overcomes many of the limitations that plague chemical analysis of the environment. While measuring body burdens is an important aspect of using a biomonitor, equally important is the measurement of biomarkers because they:

1. Provide evidence of exposure to compounds that do not bioaccumulate or are rapidly metabolized;

2. Integrate the toxicological interactions resulting from exposure to complex mixtures of contaminants;

3. Present a biologically relevant measure of the cumulative adverse effect; and

4. Measure early responses of organisms to toxicant exposure and serve as short-term predictors of long-term adverse effects.

By proper selection of a bird and a mammal from an upper trophic level, specific sources and routes of exposure can be identified. Analysis of biological markers in birds and mammals may offer a means of identifying exposures due to toxic sites from those due to other natural exposures. In guillemots we will measure induction of immune system, acute phase proteins, and cytokines as biomarkers. We will compare our results from guillemots with previous work on other bird species, our PWS work on river otters (*Lutra canadensis*), and results from current research on guillemots in Kachemak Bay. The earlier work on river otters and our current work on guillemots in Kachemak Bay will validate our study of guillemots and river otters in PWS and our biostatistical model. This model is far more detailed than those for any bird, and maintains a mammalian component for human comparisons. While guillemots are easier to capture and handle than otters during the breeding season, including otters as a component of the research may be essential because guillemots are principally available during nesting, whereas otters are year-round residents.

The purpose of our study is to assess whether populations of pigeon guillemots and river otters in PWS are recovering from the effects of the *Exxon Valdez* oil spill, and, if not, why this might be the case. We will test hypotheses that relate to possible routes of hydrocarbon contamination in the top-level predators, and use biomarkers to assess the effects of such contamination on the health of these populations. Finally, our study will provide information necessary to restore populations of guillemots and river otters, should such actions be required.

Our project is closely integrated with other research designed to assess the effects of the oil spill on nearshore vertebrate predators and their prey. We have proposed the only project that will evaluate predators that feed primarily on marine fishes in the nearshore environment. Moreover, results from our investigations are essential to provide an understanding of whether these injured resources are recovering, and what role lingering effects from oil contamination might play in the overall health of the Prince William Sound ecosystem.

NEED FOR THE PROJECT

Pigeon Guillemots

We are currently developing pigeon guillemots as an avian bioindicator for coastal ecosystems in Alaska. This research is currently underway in Kachemak Bay, Alaska, and will provide crucial baseline information for the proposed work in PWS. Guillemots are the most neritic members of the marine bird family Alcidae, which includes the murres, puffins, and auks. Pigeon guillemots are the best-suited species for monitoring nearshore ecosystem health for several reasons: (1) they are a common and widespread seabird species breeding in coastal Alaska, and in PWS specifically; (2) they forage within 5 km of the nest site in the subtidal and nearshore zones ; (3) unlike most seabird species, they do not breed in large, dense colonies; (4) they raise their young almost entirely on fish, preying primarily on intertidal and nearshore bottomfish (e.g., blennies, sculpins) and on nearshore schooling fish (e.g., sandlance); (5) the one- or two-chick broods are fed in the nest until the young reach adult body size.

Guillemots first breed at 2 years of age and adults have high annual survivorship (85%). Young guillemots normally return to the natal area to breed. Nest site fidelity of breeding pairs is high and even in instances when pairs relocate nests, the distances involved are usually small (< 30 m). Eggs are laid in a wide variety of natural crevices and holes, but most nest sites in the study area are located in cavities in rock masses. Eggs are usually laid about 50 cm from the entrance of the nest crevice, thus eggs, chicks, and attending adults are frequently accessible for data collection. Guillemots are unusual among alcids in that they normally lay two-egg clutches and raise two chicks per nesting attempt. Guillemots carry whole fish in their bills to the nest-site crevice to feed their young. Thus individual prey items can be identified, weighed, measured, and, if necessary, collected for contaminant analyses.

Other potential avian bioindicators of Alaska coastal ecosystems are unsuitable for several reasons. Larus gulls (e.g., glaucous-winged and herring gulls) have been used as models for studies on the sublethal effects of crude oil on marine birds and are widespread and common components of Alaska coastal ecosystems. But gulls frequently feed at dumps and scavenge fish offal from fishing vessels where exotic contaminants may be encountered. Larus gulls may also commute long distances to utilize these food sources; consequently the source of anthropogenic contaminants in the diet may be difficult to determine. Other alcid species (e.g., puffins, murres) and kittiwakes (*Rissa tridactyla*) forage offshore (up to 100 km from the nest site) on pelagic schooling fish and are restricted to breeding at a few relatively inaccessible colonies in the study area. Thus they are inappropriate bioindicators of nearshore ecosystem health and potential contaminants in food webs close to breeding colonies. In addition, these species are sensitive to social stimulation at the breeding colony. Thus direct mortality from plumage oiling can result in reduction of colony-wide reproductive success even in the absence of a contaminated food supply. Other alcids that forage in the neritic zone and are noncolonial (e.g., marbled murrelet) may nevertheless forage at considerable distance from nest sites, and active nests high in mature timber are extremely difficult to locate and monitor.

Guillemots have served as subjects in previous studies to assess the effects of ingested crude oil on marine birds. Nestling black guillemots (*Cepphus grylle*), a very closely related sibling species of the pigeon guillemot, were fed single doses of weathered South Louisiana crude oil (WSLC) and subsequently monitored in their natural nest site where they were cared for by their parents. These experiments demonstrated that single doses of as little as 0.1 ml WSLC resulted in declines in growth rates, increases in plasma sodium levels and increases in nasal and adrenal gland masses. The effects of the single dose were not transient, as nestlings that were dosed at roughly two weeks post-hatch were 20% lighter than controls at five weeks of age (just prior to fledging). Such persistent sublethal effects may have serious consequences for post-fledging survival. Peakall et al.'s study clearly demonstrates that guillemot nestlings living normally in their chosen habitat are tolerant to the handling and disturbance associated with assessing pollutant toxicity.

We will monitor blood parameters in pigeon guillemots breeding at Naked Island (oiled area) and Fool Islands (non-oiled area) in Prince William Sound. Data on population size, reproductive success, prey composition and provisioning rates of breeding guillemots will be collected at these same sites as part of an on-going research project conducted by the Fish and Wildlife Service and directed by Dr. David Irons. Collection of blood samples nestling and adult guillemots will be coordinated closely with Dr. Irons' field crew. Naked Island supports the highest breeding densities of guillemots in PWS and a breeding population that is adequate for the proposed research. The following parameters will be measured at accessible guillemot nests, in coordination with Dr. Irons' studies, as indices of parent-offspring productivity: (1) chick feeding rates; (2) chick meal size; (3) taxonomic composition of chick diets; (4) biochemical composition of chick food items; (5) chick growth rates and body composition; (6) nestling survival; and (7) fledging age, body mass, and body composition. Productivity will be compared with blood parameters used to monitor contaminant exposure. Nondestructive indices to stress induced by petroleum hydrocarbon ingestion will be used, such as levels of selected plasma immunoglobulins, blood plasma proteins, cell counts, and interleukin levels in blood of adults and chicks, body mass and body composition of adults and chicks, chick growth rates, and fledgling mass. These data will then be used to evaluate the factors that limit guillemot productivity. The results of this research project will provide us with the background necessary to use guillemots as avian indicators of nearshore ecosystem health in PWS.

The population status of pigeon guillemots in PWS and the northern Gulf of Alaska has been of concern for nearly a decade due to declines in number of adults observed on survey routes . Low fledging success has been attributed to changes in the abundance and distribution of forage fish resources within foraging range of guillemot nests. There is a troubling lack of information on the factor(s) responsible for poor reproductive performance.

River Otters

River otters inhabiting marine environments make extensive use of, and concentrate their activities in intertidal and subtidal zones. These high trophic-level carnivores are long-lived (> 12 years of age), and occur at densities of 0.2-0.8 otters/km of shoreline throughout the Gulf of Alaska. River otters are extremely sensitive to aquatic pollutants, yet continued to reside within the area of oil-contaminated shorelines in Prince William Sound, Alaska following the *Exxon*

Valdez oil spill. These characteristics make river otters an excellent model for assessing the effects of marine pollution on mammals, and provide an overall index to the health of the nearshore ecosystem.

River otters living in marine environments consume a diet dominated by marine fishes, which they prey upon in intertidal and subtidal zones, although they also consume a wide variety of marine invertebrates. Such nearshore areas are the most often affected by pollution. For instance, oil spilled from the *Exxon Valdez* contaminated extensive areas of the intertidal and subtidal environments, which was reflected in a loss of dietary diversity for otters inhabiting oil-contaminated shorelines. Likewise, river otters living in oiled areas exhibited a significantly lower body mass (when controlled for sex and total body length) than did otters inhabiting oil-free areas. Otters have extremely large home ranges (20-40 km of shoreline), and hence integrate the effects of pollution over wide areas.

Population dynamics of European otters (*Lutra lutra*) in coastal areas have been linked to the abundance of marine fishes; this is also likely the case for river otters inhabiting PWS. We previously demonstrated that the diversity of otter diets declined significantly following the *Exxon Valdez* oil spill. Similarly, the body mass of otters was significantly lower on oiled, compared with non-oiled, areas of PWS. Unfortunately, we were unable to determine whether such changes were caused by toxicological effects of oil on otters, changes in prey availability, or loss of habitat. We were unable to resolve this question because too few otter study sites were also sampled by those studying fishes. We have overcome this problem in the present study by close coordination with the sea urchin proposal (95087). We will share study areas with this project, and Steve Jewett has agreed to sample fishes along the same underwater transects used to sample urchins -- this will add no additional cost to either proposed study. Fish along transects will be identified to the lowest possible taxon; gadiforms, coitids, and other fish will be speared opportunistically. These samples will be frozen and archived for potential future analyses. If biomarkers from otter blood indicate exposure to oil and no oil residue is recovered from the pelage of otters, then we will evaluate these fish for oil contamination (e.g., cytochrome P-450 analysis). Oil contaminated fishes likely persist in PWS, but we believe contamination of pelage and subsequent grooming by otters is a more likely route of oil exposure). Although river otters do consume mussels (*Myrilus edulis*) in PWS, we were able to reject otters feeding on mussels as a hypothesis to explain elevated biomarkers in river otters.

We will evaluate changes in population trends of river otters by examining the frequency of latrine site abandonment on oiled and non-oiled areas. Kruuk et al. demonstrated a strong positive relationship between number of resident females and number of active holts (latrine sites) for European otters living in a marine environment. Likewise, Testa et al. showed that number of active latrines varied with estimated population size for river otters in PWS; however, too few areas were sampled to establish a regression line between these variables. Nonetheless, it is likely that abandonment of latrines provides a useful index to otter abundance, and can be used to evaluate trends in otter populations. Indeed, Duffy et al. documented that river otters throughout oiled areas of PWS abandoned latrine sites at a rate over three times greater than did otters inhabiting non-oiled areas. We will not be sampling all of the same areas we previously examined because of integration with other studies of

vertebrate predators in the nearshore environment. If differences in oiled and non-oiled areas still exist, it would be possible in subsequent years to evaluate the same sites that we sampled in 1991 to compare current values against that benchmark. Measuring trends in otter populations will not increase the costs of this study because we must evaluate these sites in the process of setting live-traps for otters in order to collect blood samples for biomarker assays.

We previously developed a nonlethal method for evaluating the effects of marine pollutants (in this instance, crude oil) on the blood-enzyme chemistry of river otters. We first noted that blood haptoglobins (an acute-phase protein) were elevated in otters inhabiting areas where crude oil was prevalent one year following the oil spill. Even two years after the oil spill and a major effort to clean oil-contaminated shores, we were able to construct a biostatistical model, using logistic regression, in which we classified > 86% of river otters correctly as having been captured in oiled or non-oiled zones. This highly sensitive model used only blood values for haptoglobin, interleukin 6 (a cytokine), and AST (a liver enzyme). Our approach has already been extended for evaluating other marine mammals, and may be applicable to other vertebrates, especially marine birds. The strength of this line of research is that we have already developed the expertise necessary to live-capture river otters, have base-line data from oiled and non-oiled areas throughout Prince William Sound, and have a predictive model that assesses the effects of oil contamination on otters, thereby providing an index to environmental health. Coupling our knowledge of otters with similar physiological data for pigeon guillemots will provide a sensitive tool for examining the health of nearshore ecosystems.

PROJECT DESIGN

A. Objectives

This proposal's overall goal is to identify the internal dosage of oil-related pollutants received by piscivorous birds and mammals foraging in the nearshore ecosystem of PWS, Alaska through measuring key parameters associated with biochemical toxicity. Thus, we will quantify the biochemical changes in birds and mammals inhabiting this fragile ecosystem. Guillemots and river otters will provide insight into the pathways and effect (if any) on food webs and the long-term health of the ecosystem. The objectives of this study are to:

1. Identify guillemot nest sites and river otter latrine sites;

2. More accurately assess the effects of oil exposure. It is our intent to collect blood from guillemots and river otters in several areas of PWS to establish control areas;

3. Use blood samples from the guillemot and river otter populations to determine levels of acute phase blood proteins such as haptoglobin, albumin and metalothionine, which are indicative of exposure and tissue damage. We also will measure cytokines such as IL-1 and IL-6 and liver enzymes such as AST;

4. Supplement our molecular work by cellular studies such as red cell volume, hematocrits and immune functions (Heinz bodies will be looked for in guillemot and river otter samples);

5. Generate risk-assessments based on these biomarkers; and

6. Measure trophic level using stable isotope analysis of guillemot samples and plants and scats from river otter latrine sites.

This proposal will produce background values for selected biomarkers and allow the development of "blood associated indices" of environmental stress in mammals and birds. These indices will be useful in comparing current and future levels of petroleum hydrocarbon contamination in PWS.

B. Methods

Pigeon Guillemots

Field studies will be conducted during the 1995, 1996, and 1997 breeding seasons in PWS, Alaska. Approximately 800 pigeon guillemots nest along the shores of Naked Island. Seventy-five active and accessible nests will be located and marked during early incubation in each of the three breeding seasons, in coordination with on-going U.S. Fish and Wildlife Service studies of guillemot reproductive success in oiled and non-oiled areas of PWS. These nests will be closely-monitored until the young fledge or the nesting attempt fails. Known-age chicks will be weighed regularly to determine individual growth rates throughout the nestling period. Blood samples (1 ml) will be collected by brachial vein puncture from each nestling at ages 20 and 30 days post-hatch (guillemot chicks normally fledge at 30-40 days post-hatch). These blood samples will be collected using SOPs developed by us during the *Exxon Valdez* spill studies to preclude sample contamination. Blood samples will be analyzed for molecular and cellular biomarkers (e.g., characteristic morphological lesions of red blood cells associated with hemolytic anemia caused by oil ingestion]). Total body fat of chicks at 20 and 30 days post-hatch will be determined by noninvasive measurement of total body electrical conductivity. Body mass and total body fat measurements will be used to develop a condition index for each chick at 20 and 30 days post-hatch.

The impact of contaminant exposure on breeding adults will be monitored using a combination of direct and indirect methods. Attentiveness of adults will be monitored during the incubation period. Frequency of chick meal delivery and meal size will be determined during the chick-rearing period by a combination of monitoring adult nest visitation rates and periodic weighing of chicks. Individual variation in exposure of adults (and chicks) to petroleum hydrocarbons will be monitored by periodically collecting food samples from adults as they return to the nest site to feed chicks and by collecting prey samples at sea. In the lab, samples of chick food will be analyzed to determine levels of aliphatic and aromatic hydrocarbon fractions using an Iatroscan MK-5 TLC/FID Analyzer System. During the chick-brooding period (0-7 days post-hatch), adult guillemots will be captured in the nest crevice, banded for later identification, and blood samples (1 ml) collected from the brachial vein. Blood samples

will be analyzed for molecular and cellular biomarkers of contaminant exposure using the same techniques applied to chick blood samples. These measurements will allow us to monitor the impact of various levels of contaminant exposure on physiological condition of chicks and foraging efficiency of adults.

River Otters

Otters, which are relatively abundant in PWS, will be captured using Hancock live traps placed on trails at latrine sites and monitored by means of a trap transmitter (Telonics, Mesa, Arizona, USA) that signals when a trap was sprung. We have used this method successfully in the past . The otter initially will be immobilized in the trap with a hand injection of ketamine hydrochloride (11 mg/kg estimated body weight, Sigma, St. Louis, Missouri, USA) and placed in a drugging box. Weights and measurements will be taken and the blood sample drawn from the jugular vein. Sexes will be distinguished by the relative position of urogenital openings and palpitation of the baculum. Age determinations will be based on tooth wear and overall size of otters.

Analyses

During the past 15 years, xenobiotics have been shown to alter immune function. Environmental chemicals interact with various parts of this complex system resulting in either suppression or hypersensitivity of immune activity and surveillance. A panel of biomarkers, including leukocyte counts, macrophage function, electrophoretic measurements of serum immunoglobins, and ELISA assays of interleukins will provide data on the health status of organisms and permit comparison of species.

At UAF, we will perform haptoglobin assays, IL-1 and IL-6 assays, and immunoglobin typing assays for the blood samples collected during this project. Cell counts will be performed by NBS contracted lab and macrophage function assays will be developed.

The following biomarker analyses will be performed on the samples: blood plasma protein and liver enzymes, cell counts and Heinz bodies, and interleukin levels. The following organism analyses will be performed for guillemots: reproductive success, nest and site abandonment, trophic level using stable isotope ratios of guillemot tissues and prey.

In the area of data analysis and interpretation, we plan on linking our data with the results on sea otters and nearshore invertebrates in PWS. Proposed studies on invertebrates, sea otters, and ours on guillemots and river otters in PWS gives these studies a holistic ecosystem approach. All data from this study will become public information. The data will be forwarded to the EVOS Trustee Council in journal format for archiving. Also, the data will be available to the public through the use of peer reviewed journals. Any different format will be mutually agreed to.

C. Schedule

Field work in Prince William Sound will be conducted during spring and summer 1995, 1996, and 1997. Data collection during three field seasons will be necessary to provide minimal information on interannual variation in reproductive success and blood chemistry of guillemots and morphometrics and blood chemistry of river otters. Guillemots normally lay eggs from late May to late June and raise their young during July and early August. Active, accessible nests of the study species will be located and marked early in the incubation period during late May and early June. Marked nests will be checked daily during the hatching period to determine hatching date, and chicks will be banded soon after hatching so that individual growth rates can be monitored throughout the nestling period. Blood samples from chicks will be collected throughout the nestling period. Chicks will be monitored throughout the nestling period to determine growth rates, fledgling age and mass, and survival until fledging. River otters are most easily live-trapped in late April and early May; we will concentrate our efforts during this period.

Following the field season, guillemot and river otter blood samples will be analyzed in the lab. These analyses will be completed before the next field season to determine the results prior to collecting additional samples from the field. A draft annual report will be prepared in April and a final report will be submitted in June. Following the analysis of samples collected during the 1997 field season, data collected during the three field seasons will be analyzed by May 1998 for relationships between blood bioindicators and reproductive success for guillemots, and between morphometrics and blood chemistry for otters. The results of these analyses will be prepared in manuscript form and submitted by the end of FY 1998.

D. Technical Support

Laboratory analyses of the blood chemistry of guillemots and river otters will be conducted in the laboratory of the Co-PI (LKD). Standard blood clinical panel and ELISA analyses of oil on pelage and plumage will be subcontracted to other laboratories. No new laboratory equipment will need to be purchased for the proposed research with funds provided by the grant. A laboratory technician will be employed to help the Co-PI and graduate research assistant with IG and HP analyses in blood, and with performing of routine laboratory analyses.

E. Location

The proposed field work will be conducted in PWS. PWS supports accessible breeding population of guillemots that are more than adequate for the proposed research. Field work on guillemots will be conducted at breeding colonies on Naked Island, Fool Island, and Jackpot Island. Approximately 800 pigeon guillemots nest along the shores of Naked Island. The Naked Island base camp would offer an ideal base for field studies on guillemots and Naked Island supports the highest breeding densities of guillemots in PWS. Fool Island has approximately 80 guillemot nests and Jackpot Island has about 60 guillemot nests and pairs are breeding at high densities in both sites. Naked Island also supports high densities of river otters, and we already have baseline data for otters on Naked Island and northern Knight

Island.

The at-sea foraging distribution of pigeon guillemots near Naked Island, Fool Island, and Jackpot Island has been the subject of previous study, as has the species composition of the diet. A field camp operated by the U.S. Fish and Wildlife Service is available for field workers on Naked Island and is within walking distance of colonies where adequate numbers of accessible guillemot nests are available.

PROJECT IMPLEMENTATION

The proposed research will be implemented by the University of Alaska Fairbanks, with assistance from and in cooperation with U.S. Fish and Wildlife Service and Alaska Department of Fish and Game biologists with expertise on the proposed study species in the proposed study area. The PI (D. D. Roby) has extensive experience with studies of the reproductive biology of high latitude seabirds and the relationship between nestling growth and productivity. L. K. Duffy has extensive experience conducting blood analyses, including previous oil spill research. R. T. Bowyer has developed and published a habitat model that will help insure the capture of river otters (by trapping in the most productive areas) and has numerous other publications on river otters. The PI and Co-PI (LKD) currently have in their laboratories the analytical equipment necessary to accomplish the proposed laboratory analyses and they are familiar with the relevant analytical procedures. To the PIs' knowledge, the expertise and equipment necessary for the proposed research are not available within the federal and state agencies that compose the Trustees Council. The PIs will be assisted by a Graduate Research Assistant (Ph.D. candidate), Field Technicians, and undergraduate field assistants who will be carefully selected from the applicant pool as qualified to participate in the proposed research.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The research described in this proposal dove-tails nicely with on-going research to assess factors limiting recovery of seabird and mammal populations damaged by EVOS. It is also relevant to efforts toward developing seabird and mammal models as upper trophic level sentinels of contaminants and changes in the availability of fish for vertebrate predators. The proposed research approach utilizes biomarkers to help identify and quantify the health of vertebrate predators within the PWS ecosystem. This approach is necessary because of the extreme complexity of assessing contaminant exposure due to temporal and spatial variability and unpredictability in PWS.

Cooperators include Dr. David Irons of the Migratory Bird Branch, U.S. Fish and Wildlife Service. Dr. Irons has had extensive experience working in the field with both guillemots nesting in PWS, and is project leader for on-going studies of the reproductive success and status of these two species in PWS. Close coordination with Dr. Irons' research teams at Naked Island will be essential for the success of the proposed research.

FY 95 BUDGET ($K)

Personnel	44.5
Travel	9.6
Contractual	54.2
Commodities	52.0
Equipment	12.4
Subtotal	172.7
Gen. Admin.	16.5
Total	189.2

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Algal Competition Limiting Recovery in the Intertidal

Project Number:	95025E
Restoration Category:	Research (new)
Proposed By:	UAF and NBS
Lead Trustee Agency:	DOI
Cost FY 95:	$205,100
Cost FY 96:	$215,500 (includes data analysis and report writing costs)
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Cook Inlet - Kenai Peninsula
Injured Resource/Service:	Intertidal organisms

INTRODUCTION

The *Exxon Valdez* oil spill and subsequent clean-up efforts had a major impact on affected intertidal communities as shown by the Coastal Habitat Injury Assessment project (CHIA). During the CHIA studies it was discovered that certain areas and habitats in the intertidal community were particularly sensitive to oiling/clean-up. One of these habitats was the lower intertidal in the highly diverse, sheltered rocky habitats in the Cook Inlet-Kenai Peninsula area (CIK). Normally the annual kelp, *Alaria*, dominates the lower intertidal area during the summer seas on. In spring (around April) the cryptic gametophytes germinate to produce small *Alaria* sporelings. These rapidly growing plants usually outcompete *Fucus* and other perennials in this zone giving rise to a large bed of *Alaria* plants in the lower intertidal. We believe that the oil spill and/or clean-up, occurring in April, significantly damaged either the gametophytes or young sporelings of *Alaria*. These damaged plants died, and the newly created bare substrate was colonized by *Fucus gardneri* and by *Neorhodomela*, both perennial algae. *Alaria* would be slow to recolonize this area because it is an annual and relies on the dispersal of spores from the large, adult sporophytes, which occurred in depressed numbers since the sporelings were destroyed by the spill. *Alaria* probably have a limited dispersal range of a few meters. Therefore, without the fertile adults nearby, spores for the next year's generation were not available. Meanwhile *Fucus* and other slow growing perennials were able to gain an ever increasing foothold. As of the end of the field season in 1991, the shift in community structure still existed.

This shift in the intertidal algal community poses an important ecological question. Will the year round presence of *Fucus gardneri* and other perennials in the lower intertidal now prevent the annual *Alaria* from returning to its natural state as the dominant provider of food and habitat in the lower intertidal community? The proposed new studies would be a continuation of CHIA research and monitoring supplemented by experiments designed to answer specific questions regarding the recovery of *Alaria*.

NEED FOR THE PROJECT

This project addresses the recovery of an injured resource, namely, the lower intertidal sheltered rocky habitat in CIK. Continued studies directed toward injured sheltered rocky intertidal communities are needed to determine how and when recovery may take place. If the shift in the dominant algal type as seen in CIK sheltered rocky algal communities persists, it may have an effect on other organisms along the food chain. Possible repercussions of *Alaria's* absence could be loss of habitat and food for other marine organisms. *Alaria* is a viable food source for sea urchins which in turn are preyed upon by sea otters.

This project is an outgrowth of the CHIA studies carried out in 1989-1991 in the Cook Inlet Kenai Peninsula area. The results will contribute to our understanding of the limits to recovery in the sheltered rocky habitat in CIK. The study is one that would fit in well with the ecosystem studies of Herring Bay. However, there is no *Alaria* in Herring Bay and, thus, this study can only be done in CIK. The CIK area is unique for this project due to the algal communities in region and to the oiling/clean-up history. This project will benefit by close cooperation with the researchers involved in the Herring Bay Monitoring and Restoration project because of the similar nature of the experiments and data analysis.

PROJECT DESIGN

A/B. Objectives and Methods

1. Quantify the population dynamics and reproductive potential of *Fucus gardneri*, *Neorhodomela*, and *Alaria* on matched oiled and non-oiled sites in CIK sheltered rocky habitats. Counts and measurements of each species will be carried out to determine densities, size classes, and reproductive capabilities.

2. Assess the competitive interactions between *Fucus gardneri*, *Neorhodomela*, and *Alaria* in recolonizing newly created bare substrata on matched oiled and non-oiled sites in CIK sheltered rocky habitats. Reciprocal clearings will be created and revisited for quantification to detect successional interactions between *Alaria*, an annual alga, and *Fucus gardneri* and *Neorhodomela*, perennial algae. Some parallel field experiments will also be set up at Juneau in areas where *Alaria* beds are adjacent to beds of *Fucus*.

3. Monitor the natural recovery of damaged algal communities on matched oiled and non-oiled sites in CIK sheltered rocky habitats. This will be a continuation of the CHIA algal percent cover experiment initiated in 1991 and provides continuity for monitoring the sites.

4. Determine the physiological factors limiting the recruitment of *Alaria*. Laboratory experiments will be set up to test various abiotic elements as limiting parameters for the recruitment of *Alaria*. Of particular interest is the toxic effect of oiling to the growth and recruitment of *Alaria* sporelings and gametophytes.

C. Schedule

During the summers of 1995 and 1996 there will be two trips to CHIA sheltered rocky sites in CIK. A tentative schedule for working days in the field is as follows:

Trip #1: April 15-30
Trip #2: July 25-August 9

A schedule of major landmarks is as follows:

Finalize the study plan	Jan-Mar 1995
Arrange boat charter	Mar-Apr 1995
Field sampling period	Apr-Jul 1995
Laboratory experiments	Apr-Sep 1995
Data compilation	Jul-Sep 1995
Data analysis/interpretation	Sep 1995-Mar 1996
Submit annual report	Apr 1996
Field sampling period	Apr-Jul 1996
Laboratory experiments	Apr-Sep 1996
Data compilation	Jul-Sep 1996
Data analysis/interpretation	Sep 1996-Mar 1997
Submit annual report	April 1997
Submit final report	July 1997

D. Technical Support

Vessel charter to support field work will be necessary. About 20 days per season will be needed. Laboratory facilities will be provided by the Juneau Center, School of Fisheries and Ocean Sciences of UAF.

E. Location

The original study sites used in the CHIA study will be used in this project. CHIA sheltered rocky sites (reference/oiled) in the Cook Inlet-Kenai Peninsula area are: Nuka Bay / McArthur Pass, Chance Cove / Morning Cove, Yalik Bay / Tonsina Bay. An additional site in Juneau will be utilized for the performance of more detailed experiments examining competition between *Fucus* and *Alaria*.

PROJECT IMPLEMENTATION

This project should be implemented by the University of Alaska in cooperation with the National Biological Survey as part of the NBS nearshore recovery research. The University already has an extensive data set on these sheltered rocky sites in CIK, including data on the percent cover and biomasses of *Fucus*, *Alaria* and other intertidal algae. This proposed study will continue an important aspect of the CHIA monitoring by updating the last information from the 1991 field season.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is closely coordinated with the past CHIA studies in CIK and with the proposed continued monitoring of the CIK intertidal areas. The project is also linked with on-going assessments being conducted by NBS in the Kenai Fjords National Park. In addition there will be close coordination and cooperation with the Herring Bay Restoration and Monitoring studies with respect to experimental design and data analysis.

FY 95 BUDGET ($K)

Personnel	121.5
Travel	8.2
Contractual	46.4
Commodities	3.0
Equipment	4.5
Subtotal	183.6
Gen. Admin.	21.5
Total	205.1

The Availability and Utilization of Musculus spp. as Food for Sea Ducks and Sea Otters

Project Number:	95025F
Restoration Category:	Research (new)
Proposed By:	Coastal Resources Associates, Inc. and UAF
Lead Trustee Agency:	DOI
Cost FY 95:	$5,500
Cost FY 96:	$0
Total Cost:	$5,500
Duration:	1 year (additional studies may be proposed for FY 96 based on outcome of FY 95 data analysis)
Geographic Area:	Prince William Sound
Injured Resource/Service:	Sea otter and harlequin duck

INTRODUCTION

This project will examine the utilization of *Musculus* by sea ducks and sea otters in Prince William Sound. *Musculus* spp. are small mytilid mussels that live attached to eelgrass and algae. Large numbers of *Musculus* recruit to selected eelgrass beds within the Sound each spring, and can reach densities of 40,000 or more per square meter. By fall, most of the mussels reach about 1 cm in length. The vast majority of the mussels disappear over the winter. Densities of larger *Musculus* (greater than 1 cm) are seldom greater than 10 per sq. meter. These small mussels provide a potentially valuable food source for both sea otters, and (more likely) sea ducks.

Monitoring of *Musculus* densities on eelgrass has been carried out as part of the subtidal coastal habitat studies (S. Jewett and T. Dean, Principal Investigators), and will likely be continued as part of a subtidal monitoring program in FY 95.

NEED FOR THE PROJECT

Musculus provide an important potential food source for sea ducks and otters. Evidence for the utilization of *Musculus*, which are generally more abundant at oiled sites, may help rule out

prey availability as a factor limiting otter or sea duck recovery.

PROJECT DESIGN

A. Objectives

Determine if *Musculus* are utilized a food by either otters or sea ducks, and determine changes to *Musculus* densities that may result from predation by otters or ducks.

B. Methods

No additional field work will be proposed for FY 95 for this task. Instead, we will concentrate our efforts on collating existing observations on the feeding habits of ducks and otters, distribution patterns of ducks and otters, and the distribution of *Musculus* within the Sound. We will examine the possibility that otters and ducks are utilizing *Musculus* by examining observational and (perhaps for ducks) gut contents of the predators. Also, we will assess utilization by overlaying distribution and abundance data for *Musculus* with that for ducks and otters. It is anticipated that we will obtain *Musculus* distribution data as part of the subtidal monitoring program, and that these data will be obtained from areas which cover a range of otter and duck densities. Additional studies (e.g., direct observations of the effects of winter feeding by ducks in eelgrass beds on *Musculus* density) may be proposed for FY 96 if the FY 95 data suggest that *Musculus* are being utilized as food.

C. Schedule

The field work (conducted under separate contract) that will generate data to be used in this task will be largely completed by December 1995. Data analysis and draft report preparation will be completed in May 1996. Deliverables will consist of an FY 95 progress report to be submitted in September 1995, and a final report to be completed by May 1996.

D. Technical Support

No outside technical support will be required.

E. Location

The project will be undertaken in Prince William Sound.

PROJECT IMPLEMENTATION

Principal Investigators for this project have been conducting injury assessment studies in the shallow subtidal within Prince William Sound since 1989, and are submitting several proposals for continued monitoring and assessment of subtidal resources, including *Musculus*. The

investigators involvement in other related projects makes them uniquely qualified to conduct cost effective studies on the interactions among *Musculus* and otters or sea ducks.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is being submitted as an integrated part of proposals dealing with the nearshore ecosystem. It is anticipated that the studies of *Musculus* will be fully integrated with other studies (e.g., monitoring within eelgrass beds) being proposed by the same investigators, and with proposed sea otter and sea duck investigations. It is anticipated that sea otter and sea duck investigators will make key distribution and feeding observations that will be critical in evaluating the interactions between *Musculus* and its vertebrate predators.

FY 95 BUDGET ($K)

Personnel	4.8
Travel	0.0
Contractual	0.0
Commodities	0.0
Equipment	0.0
Subtotal	4.8
Gen. Admin.	.7
Total	5.5

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Effects of Predatory Invertebrates on Nearshore Clam Populations in Sea Otter Habitats of Prince William Sound

Project Number:	95025H
Restoration Category:	Research (new)
Proposed By:	DOI
Cost FY 95:	$123,400
Cost FY 96:	$111,550
Total Cost:	Unknown
Duration:	3 years (however, useful results can be obtained in 1 year)
Geographic Area:	Central and western Prince William Sound
Injured Resource/Service:	Sea otter and clam

INTRODUCTION

This project is one component of an integrated ecosystem-scale Program entitled "Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound" (NVP). The NVP Program will assess predator-prey relationships in order to understand recovery patterns of significant vertebrate predators injured by the *Exxon Valdez* oil spill (EVOS) in Prince William Sound (PWS). The NVP Program will utilize measured characteristics of prey populations as indicators of predator population density. Because of the important effects of sea otters on benthic ecosystems, abundance and dynamics of significant prey should provide information on the recovery status of sea otter populations.

This project examines effects of invertebrate predators (sea stars, snails, crabs) on clams, the primary prey for sea otters in PWS, in an effort to better assess the recovery status of sea otters, and to find explanations for an apparent failure of sea otters in some areas to recover from EVOS. Nearshore clam populations in PWS are a biological resource injured by EVOS. Patterns of recovery of clam populations from the EVOS are unknown. It is possible that damage to clam populations has contributed to the apparent failure of some PWS sea otter populations to recover from EVOS. Dynamics of clam populations often are influenced substantially by patterns of predation by invertebrates such as sea stars, crabs, and snails. This project will examine the hypothesis that high rates of clam consumption by predatory invertebrates are contributing to lack of recovery from EVOS damage in clam and sea otter populations in some portions of PWS.

Although the NVP Program focuses on injured populations of vertebrate predators, this component project will, in addition, provide useful information regarding EVOS damage to subsistence use of clams. Prior to EVOS, clams were an important subsistence food at numerous locations in PWS. EVOS damage has limited subsistence use of clam resources.

This project is most likely to be effective in achieving stated goals if it is pursued over several years. However, limitation of work to FY-95 will provide information of significant value to the EVOS Restoration Program.

NEED FOR THE PROJECT

This component of the NVP Program will contribute to the ability of resource managers to understand if sea otters and clams are recovering from EVOS, and if not why not, and will allow resource managers and decision makers to use ecosystem-scale data to select appropriate restoration options for sea otters and clams in PWS.

This project will address three important issues regarding the restoration of sea otter and nearshore clam populations in PWS:

1. Are injured clam resources recovering? Clam populations are recognized as an injured resource, but recovery trends are unknown. Documentation of patterns of consumption by predatory invertebrates will provide useful information for determination of population growth trends and recovery potential for clams.

2. What factors are constraining injured resources from recovering? Clams are the most important source of nutrition for sea otters in PWS. If patterns of predation by invertebrates are contributing to low productivity in clam populations, sea otters may be suffering a consequent inability to recover effectively from EVOS damage.

3. How do patterns of clam consumption by predatory invertebrates influence subsistence clam resources in certain portions of the PWS region? An improved understanding of predatory invertebrate effects on clam availability will contribute to more judicious management of clam resources for human use during the recovery period.

PROJECT DESIGN

A. Objectives

The NVP Program will use an integrated, rigorously-managed ecosystem approach to understand the recovery status of nearshore vertebrate predators damaged by EVOS. This component project will assess the effects of predatory sea stars, snails, and crabs on clam population dynamics in sea otter habitats influenced by EVOS. We will study predation by invertebrates on both intertidal and nearshore subtidal populations of clams utilized by sea otters.

Our specific research objectives are:

1. Assemble, synthesize, and evaluate available literature and data on patterns of predation on bivalves by predatory invertebrate species known to occur with reasonable abundance in Prince William Sound, both in intertidal habitats and in subtidal habitats within the foraging range of sea otters.

2. Determine the diets of potentially important invertebrates in nearshore habitats of PWS. Initially, efforts will focus on the following species or taxa known to consume bivalves in PWS: Sea stars: *Pycnopodia helianthoides*, *Evasterias troschelii*; Crabs: *Telmessus cheiragonus*, *Cancer* spp.; Snails: *Nucella* spp. Predatory species of concern may be added or deleted from the list depending on the results of task 1 (above) and early phases of field work. Dietary data will include species composition, numbers or biomass of individuals consumed, and size distribution of individuals consumed. Dietary data will be gathered in the intertidal zone and at two subtidal depths, 6 m and 12 m, in NVP Program study sites.

3. Determine activity-time budgets of predatory invertebrates that forage on bivalves in PWS. Activity data will be integrated with dietary data (task 2 above) to estimate prey consumption rate for each species of predator.

4. Determine patterns of density for predatory invertebrates. Data from tasks 2 and 3 will be integrated with results to provide an estimate of size specific mortality rate of clam populations as a result of predation by invertebrates.

5. If feasible, determine by experimental removal the effects of predation by invertebrates on mortality, population density, and size structure of clam populations. Execution of this task will be contingent on identification of predator species with significant rates of predation, and of clam species with rates of recruitment sufficiently high that a meaningful result is plausible for the experiment.

B. Methods

Numbered sections below are keyed to task numbers shown previously:

1. This work will be done primarily by library database searches and consultation with present and past participants in EVOS Damage Assessment, General Restoration, Research and Monitoring, Habitat Protection, and related activities.

2. Samples will be gathered at three sites in study areas to be selected for the NVP Program beginning in summer 1995. Tentative study areas are north Knight Island/Naked Island, South Knight Island, and Green Island/Montague Island. Samples will be gathered at three depths (intertidal, 6 m, and 12 m). Data will be collected by direct observation during low tide or SCUBA dives (all species), and where necessary will be supplemented by examination of stomach contents.

3. Individuals will be observed and scored for activity type during samples placed by stratified random assignment through the 24-hour cycle in each of the three study areas. Intertidal organisms will be observed directly at low tide or using SCUBA gear if necessary. Subtidal species will be observed during SCUBA dives.

4. Densities of predatory invertebrates will be assessed at three sites within the three study areas on a quarterly schedule beginning in summer 1995. Techniques will vary with species depending on distributional characteristics, activity, and visibility. In most cases sampling will be done by counts in randomly-placed plots or belt transects. Intertidal species will be surveyed during low tide, subtidal species with SCUBA dives.

5. Individuals of the species selected for removal will be gathered during low tide or SCUBA dive on a quarterly basis and transported alive to a distant location to be released unharmed. Clam populations at removal and control sites (minimum of two each) will be sampled by digging and screening (intertidal populations) or by suction dredging (subtidal populations) in randomly-placed plots within the study sites. Predator removals will begin in summer 1995.

C. Schedule

Annual reports will be submitted each year in September. The final report for the project will be submitted in September 1997.

Task-specific milestones:

Task 1: Compilation of information will be completed by 1 December 1995. Information will be incorporated in technical reports and publications that result from this project.

Task 2: Field samples will be gathered quarterly beginning in summer 1995 and concluding in fall 1996. A technical manuscript will be completed and submitted for publication by 30 September 1997.

Task 3: Same schedule as task 2, above.

Task 4: Same schedule as task 2, above.

Task 5: If found to be feasible, removals will be done quarterly, beginning in summer 1995 and concluding in fall 1996. Samples of clam density will be done quarterly from fall 1995 through fall 1996. A technical manuscript will be completed and submitted for publication by 30 September 1997.

Technical support for each task will be managed through the Washington Cooperative Fish and Wildlife Research Unit (WACFWRU) and the University of Washington (UW).

Field work for the project will be done at study sites in western and central Prince William Sound, Alaska, as specified above for task 2. Laboratory work, data analyses, and production of reports will be done primarily at WACFWRU and UW.

PROJECT IMPLEMENTATION

The NVP Program will be implemented through the National Biological Survey, Alaska Research Center, Anchorage, Alaska. This component project will be implemented through WACFWRU.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The NVP Program, of which our project is part, will establish and maintain a system for integrating component projects, and for integrating NVP projects with other components of the EVOS Restoration Program. NVP will include a Program Coordinator to oversee the compatibility and complementarity of component projects, ensure that milestones are met and deliverables produced, and serve as liaison with other components of the EVOS Restoration Program. In addition, NVP will include a Program Data Manager to oversee database management, facilitate the reasonable exchange of Program data among component projects and to other elements of the EVOS Restoration Program, arrange research travel and charters for NVP investigators, and support the administrative needs of the Program Coordinator. The Program Data Manager will maintain a central repository of all biological data collected by NVP Program participants.

NVP Program participants have established near-term milestones for the development of effective Program integration and management. The milestones are reviewed in the NVP umbrella proposal document.

FY 95 BUDGET ($K)

Personnel	4.9
Travel	12.5
Contractual	60.5
Commodities	12.5
Equipment	28.0
Subtotal	118.4
Gen. Admin.	5.0
Total	123.4

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Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data

Project Number:	95026
Restoration Category:	Monitoring (new)
Proposed By:	ADEC; Institute of Arctic Biology, UAF
Lead Trustee Agency:	ADEC
Cooperating Agency:	NOAA
Cost FY 95:	$146,900
Cost FY 96:	$4,700
Total Cost:	$151,600
Duration:	2 years
Geographic Area:	There is no field work for this project
Injured Resource/Service:	Intertidal and subtidal organisms and all other injured resources and services dependent upon natural recovery

INTRODUCTION

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

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

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

The microbial and sediment chemistry field work was coordinated so that samples for both were collected at the same time in a similar manner. The sampling scheme was designed so that the chemistry and microbiology data could be integrated at some later date. Now that most of the hydrocarbon data is available, combining the data will yield valuable information on the rates of biodegradation of petroleum in contaminated sediments. The two data sets are quite large and the resources have not yet been available to combine them. Synthesis of the data is a large undertaking, but was the major peer-review recommendation for the ST001B final report on microbial activity. The proposed project would fund analysis of some necessary archival hydrocarbon samples and a researcher to complete that synthesis.

Synthesis of the intertidal and subtidal data on the microbial response to oil pollution, with the sediment chemistry data would:

1. Allow the estimation of field rates of biodegradation for hydrocarbon fractions in areas previously monitored for sediment contamination and microbial activity.

2. Establish upper and lower estimates of the persistence of these hydrocarbons in the sediments of the spill area to help establish a rate of recovery of oiled sediments.

3. Refine the tool of using relatively inexpensive microbial analyses as predictors of oil residue in sediments for future use in *Exxon Valdez* hydrocarbon monitoring and for future spills.

4. Comply with the peer-reviewer's recommendation that microbiology and chemistry data be synthesized.

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

This project is important for sediments, and intertidal and subtidal organisms. In addition, while oil itself is not an injured resource or service, it is the cause of the injuries. Monitoring the continued presence of surface oil in the environment including location, concentration, and degradation provides current information and predictions about remaining oil contamination in the ecosystem.

Assessing the location, concentration, and degradation of *Exxon Valdez* oil has been an important activity since the spill. Several microbial degradation projects were funded as part of the Natural Resource Damage Assessment and as part of the oil spill response. In addition to these data sets, the Trustee Council funded sediment and microbial projects in 1992, 1993 and 1994.

NEED FOR THE PROJECT

By using the actual hydrocarbon concentrations provided by the chemistry data, we can make predictions about the actual field rates of oil degradation, and use those values to predict the persistence of oil fractions and the natural rate of recovery of spill area sediments.

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

1. The Council's recovery objective for residual oil contamination of sediments is "...recovery has been achieved when remaining oil concentrations are reduced to a level comparable to pre-spill levels." Since biodegradation is one of the major natural mechanisms for removal of oil from contaminated sediments, this technique will help predict when that occurs.

2. Information on the rates of decomposition and persistence of oil is important foundation information for research involving any injured resource or service that exists in the nearshore environment.

3. It would bring previous Council-funded activities to the close recommended by Trustee Council peer reviewers.

PROJECT DESIGN

A. Objectives

As discussed previously, the study would have the following objectives:

1. Allow the estimation of rates of biodegradation for hydrocarbon fractions in areas previously monitored for sediment contamination and microbial activity.

2. Establish upper and lower estimates of the persistence of these hydrocarbons in the sediments of the spill area to help establish a rate of recovery of oiled sediment.

3. Refine the tool of using microbial analyses as predictors of oil residue in sediments for future use in *Exxon Valdez* hydrocarbon monitoring and for future spills.

4. Comply with the peer-reviewer's recommendation that microbiology and chemistry data be synthesized.

A further objective of this study will be to produce a manuscript from these results for publication in a peer reviewed journal. This publication is important in the transfer of lessons learned from the *Exxon Valdez* spill to the broader community of scientists, regulators and decision-makers. The information gained from this study will be very valuable to decision-makers in future oil spills.

B. Methods

All of the post-spill sediment microbiology data available was collected by personnel associated with our laboratory. This extensive data set (from 6 cruises) has already been included in LOTUS 1-2-3 spread sheets. Corresponding sediment chemistry samples were collected at the same time as sediment for microbial analysis by personnel from the NOAA Auke Bay Laboratory. Some of these samples have been analyzed for hydrocarbons and some have been archived. To achieve the objectives of this proposal we will obtain the existing chemistry data and merge this data with our existing microbiology data. In addition we will need to have approximately 35 archived samples analyzed (three replicates per sample) to provide us with sufficient data. We will query the data base to look for relationships in the data. Our objectives are to use the data to estimate persistence of alkanes and PAH in sediments and to assess the usefulness of microbial techniques for screening samples for chemical analysis. Statistical techniques will be used to determine the robustness of trends observed. We will then use the reduced data as the basis for a final report and at least one journal article. These publications are very important for information transfer. It is expected that we would first focus on data from Prince William Sound.

C. Schedule

Assuming a start date of November 1994, we would complete a draft report by July 1995 and a final report in October 1995. If funding is not received by November 1994 these dates will need to be adjusted to reflect the actual start date.

D. Technical Support

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

E. Location

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

PROJECT IMPLEMENTATION

Significant involvement is required by the Institute of Arctic Biology, University of Alaska-Fairbanks, as well as Trustee Agency personnel who worked with the sediment chemistry. The most cost-effective way to meet the project objectives is through a research associate who will work closely with Dr. Braddock. Dr. Bret Luick has agreed to do this work. Dr. Luick will bring to the project a broad background in chemistry, biology and in data reduction and manipulation.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The focus of this project is to integrate the results from two previous projects-- sediment microbiology and sediment chemistry. Representatives of Trustee agencies that are knowledgeable about the data and who will use the results will be integrated into the process.

FY 95 BUDGET ($K)

Personnel	48.9
Travel	0.0
Contractual	80.9
Commodities	4.0
Equipment	0.0
Subtotal	133.9
Gen. Admin.	13.0
Total	146.9

Kodiak Archipelago Shoreline Assessment: Monitoring Surface and Subsurface Oil

Project Number:	95027
Restoration Category:	Monitoring (new)
Proposed By:	ADEC
Cooperating Agencies:	All other Trustee Agencies
Cost FY 95:	$447,800
Cost FY 96:	$110,800
Total Cost:	$558,600
Duration:	2 years (field work will be completed in FY 95; some hydrocarbon analyses and the final report will be done in FY 96)
Geographic Area:	Kodiak Archipelago
Injured Resource/Service:	Subsistence, recreation, intertidal and subtidal organisms, all other injured resources and services dependent upon recovery of oiled beaches

INTRODUCTION

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

This project may be the last comprehensive shoreline assessment of the Kodiak area, though it may locate additional "hot spots" that need continued monitoring or treatment. Based upon information from the communities and previous surveys, approximately 100 beach segments will be chosen as representative of oiling conditions in the Kodiak area. If the survey finds more oil than anticipated, additional survey work at additional sites may be necessary in FY 96.

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

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

Project Number	Project Title	Amount Budgeted	Amount Spent
93038	Shoreline Assessment	$539,200	$353,000
94266	Shoreline Assessment & Oil Removal	$365,000	Unknown

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

- *Kodiak Archipelago, Alaska Peninsula, Cook Inlet, and Outer Kenai Coast.* Since 1990 no sites have been surveyed by the Department of Environmental Conservation on Kodiak or the Alaska Peninsula, and only limited general assessment work has been completed in Cook Inlet and the Kenai Coast. Six study sites were established by the National Park Service in 1992 along national park coast lines. Those sites will be revisited in 1994 by the National Biological Survey.

NEED FOR THE PROJECT

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

In 1993, representatives of the Trustee Council held 22 public meetings throughout the spill area, including nine in the project area. At almost every meeting, residents indicated that they believe the oil remains and it is contaminating their subsistence foods. Based on previous assessments, agency scientists expected that oil would have mostly disappeared from Kodiak and Alaska Peninsula shorelines by now. Information from the public indicates that expectation may be optimistic. Since there has been no shoreline assessment since 1990 to confirm or contradict these beliefs, one is needed now to supply information necessary for restoration efforts. If oil is not found, a believable assessment of that fact in the Kodiak area will be an important step toward restoring confidence in subsistence resources. It oil is found, it will be important for allowing residents to make their own assessment of the safety and reliability of the resources, and to determine if additional beach treatment is warranted. Determining the absence of oil is at least as important as determining the presence of oil.

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

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

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

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

PROJECT DESIGN

A. Objectives

1. Provide current information about the presence or absence of oil that is useful for all injured resources and services; that is, the project will update the 1990 information base necessary for other research and restoration in the Kodiak area.

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

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

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

B. Methods

1. Identify shorelines for survey.
Agency component. The Alaska Department of Environmental Conservation, in conjunction with the other Trustee Agencies and in consultation with the U.S. Coast Guard, will review the 1990 shoreline survey and other information and produce a draft list of shorelines to be surveyed in 1995. For planning purposes, we have assumed that about 100 sites will be surveyed.

Community component. Representatives of the Trustee Agencies will work with community organizations and landowners to identify sites where community residents believe that oil is present, and to identify important subsistence or recreation shorelines where it is important to know whether or not oil is present. To avoid deluging communities with independent visits from representatives of various projects, community work will be coordinated with other restoration work. For that reason, the exact method of community interaction cannot be determined until the 1995 Work Plan is approved. However, it will require at least one visit to most communities to identify areas to be surveyed.

2. Survey identified shorelines. Agency technical experts, upland owners, and representatives of local communities will together assess the shoreline segments and document oiling conditions. Three to four person teams will carry out the actual survey work. At least one person on each team will be recruited from the local communities. The same survey techniques used in prior years will be used again to ensure comparability of data from year to year. (See the 1993 Shoreline Assessment Report, Project 93038, for more detail on survey techniques.) Approximately 50 hydrocarbon samples will be collected and analyzed to determine the toxicity and source of the oil.

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

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

C. Schedule

December - March 1995
Initial identification of shoreline segments (agency component). Submit requests for vessel and float plane charter. Solicit professional services to accompany shoreline assessment team (See Section E: Project Implementation).

April and May 1995
Review shoreline segments (agency component), and identify segments (community component). Produce final shoreline list. Receive approvals from landowners and resource agencies to access shorelines for survey activities.

May through early September 1995
Perform survey

October 1995 through April 1996
Analyze samples to determine toxicity and source of the oil. Complete report and documentation; hold community meetings or perform other method of community outreach to distribute results to the community.

D. Technical Support

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

E. Location

The Kodiak Archipelago area.

PROJECT IMPLEMENTATION

The location and assessment of hazardous wastes and oil pollution is a basic statutory responsibility of the Alaska Department of Environmental Conservation. ADEC has maintained the state lead in discharging these responsibilities since the day of the spill. In addition, working with local communities to develop trust in the conclusions regarding the safety and condition of their resources is a public responsibility. For these reasons, and to maintain consistency with previous shoreline assessments, control over the decisions and judgements regarding the shoreline assessment, and contact with communities will remain with the Alaska Department of Conservation in cooperation with other Trustee Agencies. However, specific professional and technical portions of the project will be contracted including portions where the expertise is not available within the agency, or in some cases where competition may result in decreased costs. Some survey team members will be recruited from the local communities.

Specifically, the project manager and beach survey crew leaders will be ADEC or other trustee agency employees. At least one member of each survey team will be a short term DEC employee hired from the local communities near the survey sites. A professional services contract will be sought for geomorphological expertise to help the survey crews identify and assess beach segments. Technical contracts will be sought for technical projects needs such as vessel charters and aircraft logistics.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Until other projects in the area are identified, it is not possible to describe exactly how this project will coordinate with them. Every effort will be made to coordinate logistics with other projects. The project will maintain and update a database and knowledge of oiling that provides fundamental baseline data for investigations of the problems with injured resources and services in the Kodiak area. The Methods section describes how the project's methods and locations will be coordinated with the needs of resource agencies, landowners, and local communities. Some sharing of information and logistics may be possible with Project 95090, Oiled Mussel Bed Monitoring.

FY 95 BUDGET ($K)

Personnel	179.2
Travel	28.2
Contractual	152.4
Commodities	30.5
Equipment	20.0
Subtotal	410.3
Gen. Admin.	37.5
Total	447.8

Population Survey of Bald Eagles in Prince William Sound, Alaska

Project Number:	95029
Restoration Category:	Monitoring (new)
Proposed By:	DOI
Cost FY 95:	$48,700 (includes data analysis and report writing costs)
Cost FY 96:	$0
Total Cost:	$48,700
Duration:	1 year (survey may be repeated in 2000)
Geographic Area:	Prince William Sound
Injured Resource/Service:	Bald eagle

INTRODUCTION

Bald eagles were directly impacted by the *Exxon Valdez* Oil Spill (EVOS). Productivity of PWS bald eagles was greatly reduced during the breeding season following the spill, but returned to normal levels the next year. Population surveys did not indicate any significant difference in eagle numbers among surveys conducted in 1982 prior to the spill and in 1989-91 after the spill. Populations of herring, pink salmon and marine invertebrates, however, were also impacted by the spill and have not recovered. These species are key prey for bald eagles, and reductions in their availability to bald eagles may be adversely impacting eagle productivity and numbers. Populations of other small forage fishes that have not been studied (sand lance, eulachon, etc.) may also have been reduced by the spill, further reducing prey available to eagles. This project will re-survey the population of bald eagles in Prince William Sound (PWS) and compare the 1995 population with populations in prior years to determine if reductions in prey availability have reduced the number of eagles in PWS. The Trustees funded identical population surveys in 1989-91.

NEED FOR THE PROJECT

Bald eagles were studied intensively for two years following the spill and at a reduced level for a third year (1991). Impacts to eagle prey were not evident until after work on eagles was concluded. Eagles are slow to mature and have a long life span. We believe that eagles in Alaska may not enter the breeding population until they are at least 6-8 years old, and eagles are known to live up to at least 28 years. The young that should have been produced in 1989

would just be maturing and few would be entering the breeding population this soon. However, a reduction in numbers of breeding adults would be cause for concern. Loss of breeding adults erodes future productivity potential and exacerbates the effects of reduced productivity. Such losses would require a decade or more for recovery once the debilitating factors were corrected. This survey will help to confirm the recovery of bald eagles and alleviate concern created by the suspected reduction in prey availability.

PROJECT DESIGN

A. Objectives

1. Determine bald eagle population size in PWS in 1995.

2. Compare the 1995 population with populations in 1982 and 1989-91.

3. Confirm that the population is following the increasing trajectory modeled based on previous survey data.

B. Method

Stratified random plots will be flown by fixed wing aircraft using standard survey protocol. Island shorelines within the study area will be censused. The area, plots and shorelines surveyed and censused will be the same as in 1989-91. Differences between years will be compared using a T-test.

C. Schedule

The survey will be flown in early May, 1995. A final survey report will be completed by December 31, 1995.

D. Technical Support

None required.

E. Location

The survey will be conducted in Prince William Sound, based from Cordova.

PROJECT IMPLEMENTATION

The most appropriate entity to implement this project is the U. S. Fish and Wildlife Service. The Service has specific management authority for bald eagles under the Bald Eagle Protection Act of 1940, as amended. The Service conducted the previous surveys on PWS eagles immediately after the spill and has the technical ability, logistic capability and specific field experience to conduct the study.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Data collected during the population survey will supplement the proposed productivity surveys for bald eagles. Data may corroborate findings of studies on prey species and will contribute to an understanding of ecosystem changes in Prince William Sound.

FY 95 BUDGET ($K)

Personnel	16.0
Travel	5.5
Contractual	18.0
Commodities	5.5
Equipment	0.0
Subtotal	45.0
Gen. Admin.	3.7
Total	48.7

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Productivity Survey of Bald Eagles in Prince William Sound, Alaska

Project Number:	95030
Restoration Category:	Monitoring (new)
Proposed By:	DOI
Cost FY 95:	$81,900 (includes data analysis and report writing costs)
Cost FY 96:	$0
Total Cost:	$81,900
Duration:	1 year (survey may be repeated in 2000)
Geographic Area:	Prince William Sound
Injured Resource/Service:	Bald eagle

INTRODUCTION

Bald eagles were directly impacted by the *Exxon Valdez* Oil Spill (EVOS). Productivity of Prince William Sound (PWS) bald eagles was greatly reduced during the breeding season following the spill, but returned to normal levels the next year. Populations of herring, pink salmon and marine invertebrates, however, were also impacted by the spill and have not recovered. These species are key prey for bald eagles and reductions in their availability to bald eagles may be adversely impacting eagle productivity. Populations of other small forage fishes that have not been studied (sand lance, eulachon, etc.) may also have been reduced by the spill, further reducing prey available to eagles. This project would re-survey nest occupancy and productivity of bald eagles in PWS and contrast the results with productivity parameters found to be "normal" in studies of coastal Alaska eagle populations. The Trustees funded identical productivity surveys in 1989-91.

NEED FOR THE PROJECT

Bald eagles were studied intensively for two years following the spill and at a reduced level for a third year (1991). Impacts to eagle prey were not evident until after work on eagles was concluded. Low prey availability would likely be manifested in poor productivity. Bald eagle populations are resistant to the effects of short term low productivity. Continued low productivity, however, will eventually result in the long term reduction of bald eagle numbers. A productivity survey will determine the current level of productivity. This information is necessary to evaluate whether bald eagle populations injured by the spill are recovering as predicted based on population modeling.

PROJECT DESIGN

A. Objectives

1. Determine bald eagle productivity in PWS in 1995.

2. Compare 1995 and 1990 productivity in PWS with productivity in other coastal Alaska populations.

3. Determine whether productivity is within normal bounds.

B. Methods

Standard nest productivity protocol will be followed. Nests within the survey area will be located by helicopter in mid May and nest occupancy will be recorded. The area will be re-surveyed in the third week of July to determine the number of successful nests, the number of young produced and the age distribution of the young. These data will be compared with the same data from PWS in 1990 and from survey results from southeastern Alaska to determine if they fall within the expected range of nest occupancy and productivity for healthy coastal Alaska bald eagle populations.

C. Schedule

The initial survey will be flown in mid May, 1995, and the second survey will be flown in the third week of July. A final survey report will be completed by December 31, 1995.

D. Technical Support

None required.

E. Location

The survey will be conducted in Prince William Sound, based from Cordova, Alaska..

PROJECT IMPLEMENTATION

The most appropriate entity to implement the project is the U. S. Fish and Wildlife Service. The Service has specific management authority for bald eagles under the Bald Eagle Protection Act of 1940, as amended. The Service conducted the previous surveys on PWS eagles immediately after the spill and has the technical ability, logistic capability and specific field experience to conduct the study.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Data collected by this project may corroborate findings of studies on prey species of bald eagles and will contribute to understanding of ecosystem changes in Prince William Sound.

FY 95 BUDGET ($K)

Personnel	15.0
Travel	8.5
Contractual	52.0
Commodities	0.5
Equipment	0.0
Subtotal	76.0
Gen. Admin.	5.9
Total	81.9

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

Project Number:	95031
Restoration Category:	Research (new)
Proposed By:	DOI
Cost FY 95:	$444,800 (includes data analysis and report writing costs)
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	3 years (useful results can be obtained in 1 year; 3-year project is recommended to assess interannual variation in murrelet reproduction relative to forage fish availability)
Geographic Area:	Prince William Sound
Injured Resource/Service:	Marbled murrelet

INTRODUCTION

Marbled murrelets (*Brachyramphus marmoratus*) are the most abundant seabird in Prince William Sound (PWS) in the summer, and their population has declined significantly since the early 1970's. Although murrelets suffered high mortality in the *Exxon Valdez* oil spill, the spill cannot account for the 65% reduction in numbers observed in post-spill years. There has been no significant increase in the PWS murrelet population since 1989. The goal of this project is to determine if low reproductive success is limiting the recovery of marbled murrelets in Prince William Sound, and if so, if food limitation or predation are responsible. This project is a continuation of previous restoration studies funded by the Trustee Council, wherein nesting habitat and foraging patterns of murrelets were investigated.

NEED FOR THE PROJECT

In other areas of its range, marbled murrelet populations have declined primarily due to the loss of old-growth forest nesting habitat. However, a comparatively small proportion of potential nesting habitat has been harvested in PWS. Concurrent with murrelet population declines, populations of other apex predators that eat small schooling fish have also declined in PWS. During the breeding season murrelets depend on forage fish such as sand lance, capelin, juvenile herring and juvenile pollock. Thus, one explanation for the decline of the PWS

murrelet population is that food is limiting recovery by affecting murrelet reproductive success.

Murrelet reproduction may be limited by food if adults can not provide sufficient quantity or quality of prey to their chicks. Additionally, nest habitat or adult foraging patterns may affect the vulnerability of chicks to predation. Depredation has been a common source of nest failure for the few murrelet nests in PWS that have been monitored. This project is a multi-year study with the overall objective to determine if food availability or predation is limiting the recovery of the PWS murrelet population. This hypothesis will be investigated by comparing annual differences in murrelet reproductive parameters to relative prey abundance in PWS. In 1995 we will determine if there is evidence of food limitation by assessing chick provisioning rates and reproductive success.

This project will use two approaches to monitor murrelet productivity in PWS: i) observations of individual radio-tagged murrelets and their nesting success and ii) at-sea surveys to assess juvenile/adult ratios at selected sites.

If food is a limiting factor, management efforts can be directed at the forage fish population of PWS. As the most abundant apex predator in the PWS marine ecosystem, the murrelet is an important indicator of the health of the marine environment. Furthermore, information on the foraging ecology of the marbled murrelet can contribute to the development of PWS ecosystem trophic models. Our results will compliment studies of forage fish abundance and distribution in relation to oceanographic characteristics.

PROJECT DESIGN

A. Objectives

1. Determine the reproductive success of radio-tagged murrelets and the effects of predation and adult foraging patterns.

2. Determine if predation rates on chicks are influenced by the foraging patterns of the adults.

3. Develop an index of reproductive success by surveying for juveniles at-sea, in the early post-fledging period.

B. Methods

Thirty radio-tagged birds will be used to locate nest sites. Nest status will be determined periodically by observers using night scopes or by video cameras equipped with remote sensors. Number and timing of visits by radio-tagged adults to their chicks will be monitored using Data Collection Computers (DCCs) and hand-held receivers. Prey types and predation of adults on the nest, eggs and chicks will be determined by direct observation or video. Information on the foraging patterns of these radio-tagged adults will be collected by the same researchers contracted to capture and radio-tag the murrelets.

We will continue our efforts to develop an index of reproductive success that can be used to estimate annual murrelet production for a relatively large area. Surveys to determine the distribution and abundance of juvenile murrelets will be conducted from 25 ft. vessels using USFWS protocol. Complete shoreline surveys and randomly selected offshore transect routes will be surveyed in five areas of PWS. June surveys will be conducted to assess the adult population during the incubation phase of murrelet breeding. Follow-up surveys will be conducted at the same locations between late July and mid August, when murrelet fledglings are on the water. The ratio of juveniles to adults will be determined relative to the June adult counts and the late summer adult counts. The absolute number of juveniles will be used to assess variability among areas and years. A better understanding of juvenile dispersal is necessary to interpret at-sea surveys. Dispersal patterns of juveniles will be investigated by marking accessible chicks that are near fledging age with radio tags or dye, and following them after fledging.

We will use non-parametric tests to examine the relationships between reproductive success, predation rates and chick feeding patterns at individual nests, as nest sample size will be small (estimated 10-15 nests). On a larger scale, we will examine the relationship between murrelet productivity and forage fish abundance as determined by the forage fish study. Information on the prey used by murrelets will be provided by the BAA study on food web relationships of PWS. Vegetation and landscape data will be collected by FWS at the murrelet nests to expand the database on nesting habitat.

C. Schedules

Oct-May 1994	Contracting, hiring, procurement
May-Aug	Field work
Sept-Nov	Data analysis
Dec-Jan	Report writing
Jan 1995	Draft Report
March 1995	Final Report

D. Technical Support

This study will require FWS Geographic Information System mapping support. Ancillary prey samples we obtain (fish brought to chicks or otoliths found in chick feces) will require lab analysis.

E. Location

The primary study sites will be areas where murrelets have been successfully captured or are known to nest. These sites may include Eaglek Bay, Unakwik Inlet, Naked Island, Knight Island and Port Nellie Juan. Potential sites may also be selected from areas where other seabird or forage fish studies will be conducted. Because murrelets forage over large areas, the study area will include all of PWS.

PROJECT IMPLEMENTATION

The Migratory Bird Management Division of the U. S. Fish and Wildlife Service has conducted studies on the marbled murrelet in PWS since 1989, and has the technical expertise and logistical support required to complete this project. The FWS has located more murrelet nest sites than any other murrelet project to date. The FWS has trust responsibility for murrelets and all other seabirds as designated in the Migratory Bird Treaty Act of 1918.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is one of several proposals to investigate whether food availability is limiting the recovery of injured species that prey on forage fish. It will share logistical support and data on prey with the pigeon guillemot and kittiwake studies. This study will complement and benefit from other proposed studies: NBS's (puffin diet, PWS food web), NOAA's (forage fish, prey energetics).

FY 95 BUDGET ($K)

Personnel	224.7
Travel	8.6
Contractual	125.0
Commodities	15.0
Equipment	29.0
Subtotal	402.3
Gen. Admin.	42.5
Total	444.8

Kittiwakes as Indicators of Forage Fish Availability

Project Number:	95033
Restoration Category:	Research (new)
Proposed By:	DOI
Cost FY 95:	$198,500 (includes data analysis and report writing costs)
Cost FY 96:	$203,100 (includes data analysis and report writing costs)
Total Cost:	$819,100
Duration:	5 years, depending on frequency and duration of forage fish project
Geographic Area:	Prince William Sound and Gulf of Alaska
Injured Resource/Service:	Multiple resources

INTRODUCTION

Populations of several species of marine birds and mammals that prey on forage fish have declined in Prince William Sound (PWS) since 1972. Conversely, populations of most species that feed on benthic invertebrates have not declined. Marbled murrelets, pigeon guillemots, arctic terns, black-legged kittiwakes, glaucous-winged gulls and puffins and harbor seals feed on schooling forage fish, and have declined by more than 50%. Harlequin ducks, goldeneyes, black oystercatchers and sea otters feed on benthic invertebrates and have not declined throughout PWS, although some species were affected by the *Exxon Valdez* oil spill. This pattern of fish-eating species declining and benthic invertebrate-eating species not declining suggests that important forage fish populations may have declined in PWS in the past 20 years. There are no population trend data on forage fish in PWS to support or refute this hypothesis.

If fish-eating marine bird and mammal populations that were injured by the *Exxon Valdez* oil spill (i.e., common murre, marbled murrelet, pigeon guillemot, and harbor seal) are limited by food, recovery of these populations is not possible. Therefore, an important question concerning the recovery of these injured species is: Are their populations limited by food? The goal of this study is to evaluate the relative availability of food for kittiwake populations in PWS, which serve as an indicator of other seabird species. This study, in conjunction with the forage fish study, will provide data to answer the question: Is food limiting the recovery of injured species' populations?

The Trustee Council funded a kittiwake damage assessment study in 1989. The study found that reproductive success of kittiwakes was damaged by the oil spill. Prior to and after the spill the U. S. Fish and Wildlife Service (USFWS) monitored kittiwake population size and reproductive success in PWS. The USFWS study demonstrated that reproductive success of kittiwakes in PWS has not recovered since the EVOS and worsened in 1992 and 1993. Data from USFWS monitoring also suggested that food availability to kittiwakes nesting in PWS may have decreased. The USFWS monitoring will continue and the proposed study will complement the monitoring.

NEED FOR THE PROJECT

The common murre, marbled murrelet, pigeon guillemot, and harbor seal are injured species that eat forage fish. A major question concerning the recovery of these injured species is: Are their populations limited by food?

To answer the question of food limitation for seabirds, the best species to study are those that occur throughout PWS, and for which data on foraging and breeding parameters can easily be collected. In PWS, kittiwakes are well suited to address the food limitation question. Several parameters of kittiwake foraging and breeding indicate physiological stress caused by limited food. There are 24 colonies of kittiwakes spread throughout PWS, and because kittiwakes are colonial cliff-nesters their productivity and brood size can be obtained for all colonies fairly easily. Other breeding and feeding parameters are also inexpensive and easy to record. Also, there are ten years of population size and productivity data for kittiwakes in PWS that can be used for comparison.

Because kittiwakes prey on similar forage fish species as marbled murrelets, pigeon guillemots, and murres, they act as indicator species of the availability of prey such as juvenile herring, sand lance, and various osmerids (smelts). However, because kittiwakes are surface feeders, a diving species such as the pigeon guillemot should also be studied.

The USFWS will continue to monitor kittiwake colony size and productivity in PWS. The project proposed here will expand on this basic monitoring by providing reasons for the continuing failure of kittiwakes to reproduce since the EVOS. Information about the availability and distribution of forage fishes in PWS generated by this project will also be useful for understanding food web relationships of other bird species that were injured by the EVOS, and the entire PWS ecosystem.

PROJECT DESIGN

A. Objectives

1. Determine relative food availability to kittiwakes by

   a. Monitoring reproductive parameters, including egg laying date, clutch size, hatching success, growth rates, fledging success, brood size at fledging and overall productivity.

   b. Monitoring diets and foraging parameters such as: foraging trip length, foraging trip distance, foraging areas, chick provisioning rates, species and size of prey consumed.

   c. Monitoring survival rates of adults.

B. Methods

Twenty-four kittiwake colonies in PWS and three colonies in the northern Gulf of Alaska will be monitored for productivity and brood size at fledging. Clutch size will be monitored at 10 to 12 colonies in PWS. Hatching success, chick growth rates, fledging success, and diets will be monitored at four to six colonies in PWS. All parameters will be measured at two or three colonies in PWS.

Methods for measuring reproductive parameters and foraging of kittiwakes are described in Irons. All methods have been tried and were successful in one or more other studies on kittiwakes. Productivity will be determined for entire colonies in PWS and study plots at colonies outside PWS. Productivity will be determined by counting the numbers of nests in June and the number of pre-fledging chicks in August and calculating an average number of chicks per nest. Egg laying dates, clutch sizes, hatching success, chick growth rates, provisioning rates and fledging success will be determined for nests in study plots at colonies. Foraging trip length will be measured using radio-tagged birds and data collection computers to monitor their foraging trips. Foraging trip distance and foraging areas will be determined by locating foraging radio-tagged birds with boats and planes in conjunction with the marbled murrelet project.

C. Schedule

October-May	Prepare for field season
June-August	Field work
Sept.-Nov.	Data analysis
Dec.-Jan.	Report Writing
January 1995	Draft Report
March 1995	Final Report

D. Technical Support

This project will require technical support for analysis of diet samples and GIS analysis.

E. Location

Kittiwakes will be monitored throughout Prince William Sound at 24 kittiwake colonies and in the northern Gulf of Alaska at the Wooded, Chiswell and Barren islands in conjunction with the proposed puffin project.

PROJECT IMPLEMENTATION

The U. S. Fish and Wildlife Service is the most appropriate entity to conduct this project. The National Biological Survey will be responsible for the data collection at the Wooded, Chiswell and Barren islands, which will occur in conjunction with the puffin project.

The U.S. Fish and Wildlife Service has the technical expertise to conduct this study. Other similar projects have been conducted by the USFWS on kittiwakes in Prince William Sound for several years. Successful methods have been established to collect and analyze data. The USFWS has trust responsibility for kittiwakes and all other seabirds as designated in the Migratory Bird Treaty Act of 1918.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will collaborate with several other projects that will investigate whether food availability is limiting the recovery of injured species that prey on forage fish. Proposals on this topic will be submitted by several agencies and private groups. The agencies include NOAA, NBS, ADFG, and USFWS. There will also be proposals concerning prey energetics, which was advertised as a NOAA broad agency announcement. This study meshes especially closely with NOAA's forage fish study, NBS's puffin and murre studies, the food web study, with the BAA topic of energetics of prey, and with other FWS studies on murrelets and pigeon guillemots. The forage fish project will provide data on the abundance of forage fish in areas where kittiwakes, puffins, pigeon guillemots and murrelets feed. The energetics study will provide data on the value of various prey species to kittiwakes and other fish eating seabirds. This suite of bird studies along with the forage fish study should be successful in determining if food, predation, oil toxicity or a combination of these factors are limiting the recovery of injured species.

FY 95 BUDGET ($K)

Personnel	106.9
Travel	6.0
Contractual	19.1
Commodities	15.0
Equipment	34.1
Subtotal	181.1
Gen. Admin.	17.4
Total	198.5

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Symposium on Seabird Restoration

Project Number:	95038
Restoration Category:	General Restoration (new)
Proposed By:	Pacific Seabird Group
Lead Trustee Agency:	DOI
Cost FY 95:	$74,400
Cost FY 96:	$10,100
Total Cost:	$84,500
Duration:	2 years
Geographic Area:	There is no field work for this project
Injured Resource/Service:	Common murre, marbled murrelet, pigeon guillemot, black oystercatcher

INTRODUCTION

The Trustee Council has struggled for the past five years with determining the most efficacious means to restore seabird populations that were damaged by the oil spill. The Pacific Seabird Group (PSG) proposes to host a symposium in Alaska during September or October 1995 to discuss the science of seabird restoration. PSG would invite and sponsor knowledgeable scientists from around the world to discuss the benefits and costs of every technique to restore seabirds that has been used.

The affected seabird species include common murres, marbled murrelets, Kittlitz's murrelets, pigeon guillemots, tufted puffins, cormorants, black oystercatchers, black-legged kittiwakes and ancient murrelets. Some of these species suffered severe losses in the spill, but little work has been done to restore their populations.

NEED FOR THE PROJECT

The symposium will provide state and federal trustees with a realistic approach to the most effective means of restoring Alaska's seabird colonies. PSG has been involved with the EVOS restoration process since the beginning, and we believe this symposium would assist the Trustee Council with seabird restoration.

PROJECT DESIGN

A. Objectives

1. Identify and evaluate the techniques that can be used to restore seabird populations injured by oil spills.

2. Gather knowledgeable scientists from throughout the world to attend and participate in discussions.

B. Methods

(1) Identify suitable scientists; (2) inquire as to their availability and need for travel funds; (3) develop a symposium format that will concentrate on discussion and practical experiences. Formal paper sessions will be included, but the focus will be on discussions to identify the most efficacious restoration methods; (4) Minutes of the meeting and general conclusions will be available. A synthesis of the discussions and papers could be published, but is not included in this proposal.

C. Schedule

Contract Award	Month 1
Work Begins	Month 1
Scientists identified and invited	Month 3
Planning completed	Month 5
Draft Report	October 1995
Final Report	December 1995

D. Technical Support

None.

E. Location

Kodiak or Anchorage, after discussions with the Trustee Council.

PROJECT IMPLEMENTATION

PSG should undertake this project. PSG is an international organization that was founded in 1972 to promote knowledge, study and conservation of Pacific seabirds. PSG draws its members from the entire Pacific Basin, and includes biologists who have research interests in Pacific seabirds, state and federal officials who manage seabird refuges and individuals with interests in marine conservation. PSG has hosted symposia on the biology and management of virtually every seabird species affected by the *Exxon Valdez* oil spill, and has sponsored

symposia on the effects of the spill on seabirds. PSG is uniquely qualified to implement this project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project can be integrated with all on-going seabird restoration projects.

FY 95 BUDGET ($K)

Personnel	6.0
Travel	30.0
Contractual	35.0
Commodities	0.0
Equipment	0.0
Subtotal	71.0
Gen. Admin.	3.4
Total	74.4

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Common Murre Productivity Monitoring

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

INTRODUCTION

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

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

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

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

NEED FOR THE PROJECT

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

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

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

PROJECT DESIGN

A. Objectives

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

B. Methods

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

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

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

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

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

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

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

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

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

C. Schedule

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

D. Technical Support

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

E. Location

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

PROJECT IMPLEMENTATION

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

COORDINATION OF INTEGRATED RESEARCH EFFORT

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

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

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

FY 95 BUDGET ($K)

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

Introduced Predator Removal from Islands: Follow-up Surveys

Project Number:	95041
Restoration Category:	General Restoration (continuation of 94041)
Proposed By:	DOI
Cost FY 95:	$66,500 (includes $20,400 for data analysis and report writing of FY 94 work)
Cost FY 96:	$6,200 (data analysis and report writing only)
Total Cost:	$72,700
Duration:	2 years
Geographic Area:	Simeonof and Chernabura islands in the Shumagin Islands, western Gulf of Alaska
Injured Resource/Service:	Black oystercatcher, pigeon guillemot, common murre

INTRODUCTION

In 1994, the Trustee Council funded a project (No. 94041) to restore populations of injured black oystercatchers (*Haematopus bachmani*) and pigeon guillemots (*Cepphus columba*) by removing introduced arctic foxes (*Alopex lagopus*) from Simeonof and Chernabura islands in the Shumagin group, western Gulf of Alaska. It will be necessary to survey these islands in 1995 to eradicate remaining foxes or to determine that none remain. In addition, surveys of oystercatchers, guillemots and other seabirds will be conducted to determine whether their populations are beginning to increase following fox removal.

NEED FOR THE PROJECT

Few options are available for direct restoration of black oystercatcher and pigeon guillemot populations injured by the oil spill, but it is possible to take action to cause populations to expand at the western edge of the area affected by oil by removing introduced foxes from islands where they have kept numbers of oystercatchers, guillemots, and other populations of seabirds depressed. Fox removal efforts began at Simeonof and Chernabura islands in 1994, and it will be necessary to return to the islands in 1995 to verify that no foxes remain. Following a winter with no foxes present, evidence like lack of fresh tracks and scat, and grown-over fox trails may be used to determine if foxes remain.

PROJECT DESIGN

A. Objectives

1. Determine that arctic foxes have been eradicated from Simeonof and Chernabura islands.

2. Document increases in black oystercatcher and pigeon guillemot populations at Simeonof and Chernabura islands as a result of elimination of introduced foxes.

B. Methods

Fox Surveys. Crews will check beaches, trails, and creek banks for signs of foxes on Simeonof and Chernabura islands. If it is determined that foxes remain, trapping according to methods used in 1994 will be used to remove remaining foxes.

Oystercatcher and Guillemot Surveys. As in 1994, oystercatchers will be monitored by surveying beaches on foot and from a small inflatable boat operated within 30 m of the shoreline. Guillemots will be counted from a small inflatable boat during nearshore surveys of island perimeters. Surveys will be conducted at Simeonof, Chernabura, and the three control islands surveyed in 1994 (Bird, Atkins, and Herendeen). All surveys would be conducted during the early incubation period of each species. At least 3 surveys will be made of each island to provide a basis for examining variation among counts.

C. Schedule

Oct-Dec 94	94041 data analysis
Dec -Jan 95	94041 report writing
Feb 15, 95	94041 draft report
Mar 95	Complete 95041 study plan, procure equipment, and select temporary field personnel
Mar 31, 95	94041 final report
Apr 95	Continue procurement of equipment and supplies
May 95	Organize and pack supplies, and train field personnel
Jun 95	Establish camps on Simeonof and Chernabura islands to check for signs of foxes and to survey populations of oystercatchers and guillemots at these two islands and the "control" islands (Bird, Atkins, and Herendeen).
Jul 95	Leave Shumagin Islands and return to Homer
Aug 95	Clean and store equipment, begin report
Sep-Oct 95	95041 data analysis and writing draft report
Nov 95	Submit revised 95041 report

D. Technical Support

None required

E. Location

The project will occur in the Shumagin Islands. The nearest community is Sand Point, about 80 miles away.

PROJECT IMPLEMENTATION

The DOI-Fish and Wildlife Service is the most appropriate entity to conduct this project because this is a followup to the project began in 1994. The same people that conducted the 1994 program would be best suited because of their local knowledge of the project sites, experience in evaluating the success of fox removal efforts, knowledge of locations of bird study plots, and familiarity with the 1994 data for comparisons. Furthermore, the restoration sites are on the Alaska Maritime National Wildlife Refuge, and the staff of that agency is in the best position to insure that the information gained is incorporated into the long-term refuge management program.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This is a direct restoration project.

FY 95 BUDGET ($K)

Personnel	38.0
Travel	12.8
Contractual	0.0
Commodities	5.5
Equipment	4.5
Subtotal	60.8
Gen. Admin.	5.7
Total	66.5

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In situ Formation and Ecotoxicity of Hydrocarbon Degradation Products Produced by ultramicrobacteria

Project Number: 95044

Restoration Category: Research (new)

Proposed By: Institute of Marine Science, UAF

Lead Trustee Agency: NOAA

Cost FY 95: $135,100

Cost FY 96: Unknown

Total Cost: Unknown

Duration: 5 years

Geographic Area: Prince William Sound

Injured Resource/Service: Multiple resources

INTRODUCTION

Marine bacteria are abundant throughout the oceans. Their biomass is about equal to that of other organisms in the oceans combined. Abundance and small size gives a large surface area for the collection of organic compounds. These compounds are i) remineralized to support primary productivity, ii) reorganized into new organic compounds, or iii) passed to bacterivores and on up the food chain to an extent that rivals primary productivity by phytoplankton.

Most marine bacteria are poorly understood because they are too small to be seen by conventional microscopes. Adapted to growth in dilute media, they fail to grow on conventional recipes so that focus has been on large but rare forms that are particularly fast-growing in the laboratory. Most measurements of hydrocarbon oxidizing bacterial populations related to the *Exxon Valdez* oil spill include only those which will attain large populations in conventional laboratory culture, while most activity is associated with the smaller forms.

New ways to evaluate the mostly undescribed but more typical marine bacteria include phylogenetics, flow cytometry, and extinction culture. Their growth rates *in situ* can be measured by dilution culture. According to phylogenetics, these oligotrophs may be in either of two kingdoms, the Eubacteria and the Archaea. All other organisms are in the third. Most with Eubacterial DNA belong to members of new and yet undescribed genera. A few of these super-small organisms have now been cultivated. To date none of the Archaea have been isolated. However their 16S rRNA sequences indicate particular importance in extreme

environments such as Antarctica and Prince William Sound where abundances exceed 105 organisms per ml.

Ecosystem function is probably most closely tied to water chemistry. The biomass of marine organisms is clearly controlled by major nutrients, and most of these are liberated from organics by bacteria. Other interspecies interactions and chemically mediated responses may be even more important but more difficult to observe. Ecosystems have been relatively stable over eons at a state far from thermodynamic equilibrium. One explanation of this highly improbable behavior is that organisms learned from their mistakes that harmonious coexistence is preferable to exclusionary competition. This learned behavior is then shared among contemporary species much as strategies for assembling antibiotic resistance mechanisms is shared. Because bacteria are prone to sharing genestocks with dissimilar organisms, they may have additional importance to ecosystem function as mediators of information. This information is used in part to maintain ecosystem balance.

Ecotoxicity of aromatic hydrocarbons is connected to their physical properties. Hydrophobicity drives them into the phospholipid envelopes of bacteria where oxidases therein cleave the rings to form hydrophilic carbonyls. Less than half of these intramembrane products continue on into the organism for further oxidation. Most escape to the environment. Because active transport is now required for reprocessing these products have very long half-lives, sometimes of the order of centuries. Metabolic product stability exceeds that of hydrocarbons in seawater so that a mechanism exists for long-term accumulation of these carbonyl products in the environment.

Like the oxidation products of DDT, it is mostly the products of oxidation that are responsible for hydrocarbon toxicity. The toxicity of crude oil increases following partial processing by microorganisms, and Alyeska consultants found that ballast water treatment pond effluent remained inhibitory after the volatile hydrocarbons had been removed. In higher unlike the dioxygenase systems of hydrocarbon degrading bacteria. Suspected compounds are somewhat uncommon moderate chain-length organic acids with additional functional groups. Important members still lack published mass spectra.

Following the discovery that large amounts of oxidation products are released by the microbial metabolism of hydrocarbons by conventionally-isolated bacteria, new techniques were developed for the cultivation of what is believed to be the more typical marine bacteria present as discussed above. The first of these isolated, *Oligobacterium* RB 1, is of record small size, only 0.06 um3 in volume. This organism, randomly selected from Resurrection Bay seawater, will grow on a large number of substrates including toluene. Like conventional isolates, it produces large amounts of these oxidation products of metabolism. Moreover mixed cultures from the ballast water treatment pond in Port Valdez liberate these products as well. It is our goal to understand the behavior of typical marine bacteria in general with particular reference to general ecosystem function. In this project we propose to focus on metabolism of anthropogenic hydrocarbons by these organisms in an effort to predict how the system, including higher organisms might respond to chronic pollution. Related programs are funded at a modest level by the US Environmental Protection Agency Office of Exploratory Research and By Ocean Sciences at the National Science Foundation.

NEED FOR THE PROJECT

Dissolved hydrocarbons appear to remain in the marine environment for hundreds of years. Those that are microbially oxidized liberate products of metabolism that are toxic. Similar toxic products of metabolism probably enter the marine system by incomplete treatment of ballast water. However precise chemical characterization of these compounds has not yet been performed and specific toxicological studies are therefore absent. While Prince William Sound is subject to hydrocarbon input from various sources, detailed studies of hydrocarbon bioconversion, and particularly the potential effects of those bioconversion products on other organisms, are absent. Most studies are restricted to observation of short-term death rates following exposure to weathered crude oil. However these LD 50's overlook the effect of irritants on indigenous species. Studies here represent a more general approach with attention to the molecular mechanisms involved. While some studies of the populations involved in hydrocarbon degradation and toxic product production exist, the vast majority of the responsible organisms are eliminated from consideration by the methods used. The proposed program will provide a modern account of Prince William Sound Microbiology with particular emphasis on hydrocarbon degrading ultramicrobacteria, and evaluate the roles of these organisms in i) recycling organic carbon to higher organisms, and ii) converting influent hydrocarbons to toxic compounds.

PROJECT DESIGN

A. Objectives

1. Provide contemporary measurements of hydrocarbon concentrations in Prince William Sound.

2. Determine the fraction of total PWS bacteria that are capable of oxidizing hydrocarbons.

3. Test random extinction-culture isolates of indigenous bacteria for inducibility toward hydrocarbons.

4. Identify the products of metabolism of aromatic hydrocarbons on representative cultures.

5. Identify the toxicological mechanisms of specific ring-cleavage products produced.

B. Methods

1. Hydrocarbon concentrations are obtained by purge and strip techniques.

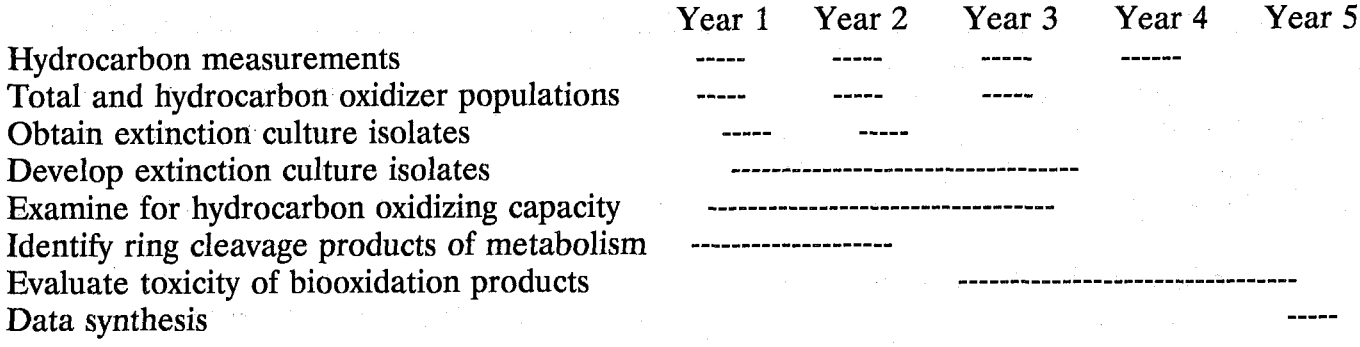
2. The fraction of bacteria with constitutive ability to oxidize hydrocarbons is observed by autoradiography with total populations characterized by high resolution flow cytometry.

3. Random marine bacteria are selected by extinction culture. Their ability to metabolize hydrocarbons is evaluated, following exposure to ug/liter inducing concentrations of hydrocarbons, by collection of the products of metabolism from radiolabeled hydrocarbons.

4. Products of metabolism of aromatic hydrocarbons by these cultures are initially located by the affinity of those products for acidic aqueous media. Detailed characterization is by derivatization within the aqueous phase, solvent-extraction, fractionation on silica gel columns, and analysis of the resulting fractions by gas chromatography for evaluation of the total compounds present, and by mass spectrometry for chemical identification (methods now under development).

5. The offending compounds will be examined by published methods for cytotoxicity, and teratogenicity, for their influence on sensitive enzymatic processes by newly developed enzymatic procedures, for their influence on species interactions by success in interspecies competition in nutrient-limited experiments and chemotaic avoidance behaviors.

C. Schedule



D. Technical Support

Project investigators are competent in all proposed aspects except toxicity which will be done in collaboration with colleagues.

E. Location

Cruise locations will include Prince William Sound near currently-contaminated beaches and in Port Valdez where discharge of the offending compounds is suspected.

PROJECT IMPLEMENTATION

The project should be implemented at the Institute of Marine Science, through the School of Fisheries and Ocean Sciences because it is uniquely capable of doing so. Unique capabilities include:

1. Capabilities for cultivating ultramicrobacteria.

2. Availability of flow cytometry with sufficient sensitivity for enumerating, sizing, biochemically analyzing, and physically sorting marine bacteria.

3. Capabilities of characterizing hydrocarbon oxidizing ultramicrobacteria, previously unknown and unrecognized in oil-contaminated sediments, as a major player in beach restoration.

Other relevant areas of special expertise include:

1. An understanding of hydrocarbon bioconversion kinetics, i.e. how bioconversion rates respond to hydrocarbon concentrations from both theoretical and experimental aspects.

2. An understanding of flow cytometry from both theoretical and experimental aspects. This allows, for example, use of light scatter theory to size marine bacteria including those so small that they have previously been ignored, and to account for differences in shape and refractive index, as well as size on the signal produced from seawater samples.

3. Familiarity with the concentrations and disposition of dissolved hydrocarbons produced from the *Exxon Valdez* oil spill, and expected decomposition rates through direct measurements. This was first reported in our discovery of monoterpenes as a normal hydrocarbon constituent of Prince William Sound.

4. Familiarity with the types of compounds expected to be produced by the metabolism of anthropogenic hydrocarbons through laboratory experiments and an ongoing program for their identification and quantification.

5. An understanding of how oil-phase hydrocarbons coat gravel, and how this coating extracts dissolved hydrocarbons passing through them (Alaska Science and Technology final report and in preparation).

6. Equipment purchased and a developing program for the characterization of newly isolated hydrocarbon-oxidizing ultramicrobacteria from patterns generated on state-of-the-art two-dimensional electrophoresis.

7. Some understanding of thermodynamics of whole biological systems which allows consideration of ecosystem interactions, now sometimes called "global physiology".

8. Familiarity with the mechanisms of active transport, and have proposed a new one (vectorial partitioning) for the sequestering of hydrocarbons to accompany the three known forms.

9. Ability to evaluate *in situ* hydrocarbon oxidation rates following the development of sensitive new methods.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The project will stand alone. Experts in this laboratory include B. R. Robertson, a microbiologist with exceptional skills in flow cytometry, and Dr. Luis Pinto, a geochemist with skills in the quantitative analysis of the organic compounds in seawater. We will work closely with colleagues in a number of areas.

FY 95 BUDGET ($K)

Personnel	74.0
Travel	4.0
Contractual	7.1
Commodities	2.0
Equipment	0.0
Indirect Costs	36.4
Subtotal	123.5
Indirect Costs	11.6
Total	135.1

Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement

Project Number:	95048
Restoration Category:	Monitoring (new)
Proposed By:	Natural Resource Consultants, Inc.
Lead Trustee Agency:	ADFG
Cost FY 95:	$99,200
Cost FY 96:	$16,600
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Kenai River, Akalura Lake, Red Lake, Coghill Lake, Chignik Lake, Kasilof River, Crescent River, Wood River Lakes
Injured Resource/Service:	Sockeye salmon

INTRODUCTION

The *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) has identified several sockeye salmon stocks that are not recovering from the overescapement caused by the *Exxon Valdez* oil spill. Injured sockeye salmon stocks include sockeye from the Kenai River in Upper Cook Inlet, and Akalura Lake and Red Lake on Kodiak Island. Additionally, the EVOSTC is funding a restoration project on Coghill Lake near Prince William Sound (lake fertilization to enhance growth), although the declining sockeye runs have not been linked to the oil spill. Although the EVOSTC did not list Chignik Lake as a potentially injured lake, Chignik Lake received more than twice its escapement goal as a result of the oil spill in 1989. Monitoring of Chignik Lake in relation to the overescapement has not been conducted.

Overescapement of sockeye salmon to these lake systems is believed to have led to exceptionally high densities of salmon in the lakes, which in turn has caused reduced growth. Schmidt et al. suggested that small sockeye fry in the fall cause exceptionally high mortality during winter, a period when sockeye salmon may lose 10% body weight because few or no prey are available.

Presently, the EVOSTC and the Alaska Department of Fish and Game (ADFG) are monitoring fry abundance and size in the Kenai River system and smolt abundance and size in Akalura Lake and Red Lake. However, monitoring of sockeye smolt lengths in these systems began only recently. Few years of data are available for comparison before and after the overescapement. Thus, the effect of overescapement on salmon growth is difficult to evaluate. Furthermore, growth of sockeye smolts migrating through oiled waters, especially in Prince William Sound, may have been reduced. This effect has been documented for pink salmon . To our knowledge, the early marine growth of sockeye salmon from the areas affected by the *Exxon Valdez* oil spill has not been examined.

Scale measurements offer a relatively inexpensive means to evaluate the effect of overescapement in freshwater and oil in the marine environment on sockeye salmon growth. Scale measurements can also be used to inexpensively evaluate the recovery of the sockeye populations. Sockeye salmon scales are correlated with fish length and have been used to describe sockeye salmon growth in lakes and the ocean.

The objectives of the proposed project are to:

1. Measure annual growth zones of sockeye salmon before, during, and after the oil spill from systems affected by the oil spill (Kenai River system, Akalura Lake, Red Lake, Coghill Lake, Chignik Lake) with sockeye growth from systems less affected by the oil spill (Kasilof River, Crescent Lake, Black Lake, and the Wood River Lake system),

2. Compare trends in annual growth zone measurements of sockeye from systems affected by overescapement or oil in the marine environment with that of systems not affected,

3. Determine the relative magnitude of reduced sockeye growth in freshwater or first year at sea as a result of overescapement or the presence of oil in the marine environment and evaluate the recovery of sockeye growth in years subsequent to the spill.

NEED FOR THE PROJECT

The declining sockeye runs to the Kenai River, Red Lake, and Akalura Lake are believed to be related to reduced growth caused by overescapement. The effect of large escapement in Chignik Lake has not been evaluated. Additionally, the effect on growth of Coghill Lake sockeye migrating through oil-contaminated waters in Prince William Sound has not been evaluated, although Willette demonstrated that growth of pink salmon in Prince William Sound was reduced.

Efforts to monitor the size of sockeye salmon smolts emigrating from these lakes began only recently and few data are available for comparison prior to the oil spill. In order to document the magnitude of the effects and the recovery of salmon in these areas, measurements prior to the spill, during the spill, and subsequent to the spill are needed. Scale measurements, which are an index of salmon growth, offer an inexpensive means to monitor the recovery of sockeye salmon in these affected areas. Furthermore, detailed analyses of freshwater and marine growth of sockeye from oil-affected and unaffected stocks over the past 20 years could help identify non-spill factors influencing growth and production. Thus, the use of scale measurements of a variety of sockeye stocks will enable us to distinguish effects of the oil spill from other environmental factors.

PROJECT DESIGN

Adult sockeye salmon scales would be obtained from ADFG for each of the populations described above. ADFG collects these scales as part of their normal management activities. Scales are available back to at least 1970 for sockeye stocks in the Kenai River, Kasilof River, Red Lake, and Coghill Lake stocks. Akalura scales are available back to at least 1985. Scales for Chignik Lake, Black Lake, and Wood River Lakes sockeye stocks are available back to 1920; these scales have already been measured through 1990. Thus, scales measurements need be updated for these only stocks.

At least 100 scales from the dominant age group of each stock will be measured for each year. This sample size was determined to be adequate by Zimmermann. The scales will be measured by the Optical Pattern Recognition System (OPRS) at Dr. Donald E. Rogers' laboratory at the University of Washington. The scale measurement methodology will follow that described by Zimmermann, who was a graduate student supervised by Dr. Rogers and Dr. Ruggerone.

Annual frequency distributions of scale measurements will be plotted and analyzed for normality. Skewness of the frequency distributions may indicate size-biased mortality, which may indicate the effect of predation on smaller individuals. Trends in scale growth measurements will be analyzed within and among sockeye stocks in relation to the overescapement and oil spill events.

Scales available through 1995 will be measured, analyzed, and reported during FY95. Scales collected during 1995 represent the last progeny of the 1989 brood year. Scale collected during 1996 and 1997 represent progeny of sockeye spawning after the spill. Thus, we recommend two additional years of investigation (FY96, FY97) to examine the recovery of the sockeye stocks. These two years of investigation would be conducted at a much lower cost.

PROJECT IMPLEMENTATION

The project will be conducted by Dr. Gregory T. Ruggerone, Natural Resources Consultants, and Dr. Donald E. Rogers, Fisheries Research Institute, University of Washington. Both Ruggerone and Rogers have extensive first-hand experience with interpretations of scale measurements and have published numerous papers involving sockeye salmon scales. This team offers excellent qualifications and has available the needed equipment to conduct the investigation.

COORDINATION OF INTEGRATED RESEARCH EFFORT

ADFG will provide sockeye scales for each of the stocks described above. These scales were collected as part of the ADFG's routine management activities. Sockeye scales from Chignik Lake and the Wood River system have already been measured and transferred to a computer database for return years 1950 to 1990. Thus, scale measurements for these stocks need only to be updated.

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	85.0
Commodities	0.0
Equipment	0.0
Subtotal	92.2
Gen. Admin.	7.0
Total	99.2

Large-Scale Coded Wire Tagging of Prince William Sound Herring

Project Number:	95051
Restoration Category:	General Restoration (new)
Proposed By:	Natural Resources Consultants, Inc.
Lead Trustee Agency:	ADFG
Cost FY 95:	$231,900
Cost FY 96:	$514,800
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring, commercial fishing

INTRODUCTION

The *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) has identified several fish stocks that are not recovering from the effects caused by the *Exxon Valdez* oil spill. Prince William Sound herring is one of these stocks. Population biomass has unexpectedly declined from over 130,000 tons in 1992 to about 7,000 tons in 1994 due mainly to the demise of a particularly strong 1988 year class of herring that was anticipated to support large harvests and future year classes through spawning escapement.

The 1993 herring run to Prince William Sound was approximately 100,000 tons below expected abundance resulting in severe commercial fishing restrictions. Returning fish were observed to have VHS disease and were in a weakened state with unusual behavior. In 1994, the herring run further declined to less than 7,000 tons below the 8,400 ton minimum required to allow any commercial fishing and fish were again found with evidence of VHS disease.

The current level of biomass and age composition of the population indicates the 1996 commercial fishery may have to be curtailed and future commercial fisheries harvests will likely be reduced compared harvests of the past five to eight years. Herring stocks and fisheries in other areas of Alaska appear to remain healthy and some are continuing to expand.

Numerous theories have been proposed to explain the decline in Prince William Sound herring stocks including long-term effects of the *Exxon Valdez* oil spill, limitations on food supply, competition with pink salmon hatchery releases, and effects of the VHS disease. Oil spill

effects studies have shown the possibility that egg, larvae, and juvenile herring were, and may continue to be, affected by the presence of oil. Genetic damage, reduced immune response, and possible lowered reproductive capacity are but a few of the potential oil spill related effects that are likely to have been felt by the 1988, 1989 and possibly later year classes of herring in Prince William Sound. Chronic low-level oil contamination may be further affecting recent year classes.

Critical to the study of Prince William Sound herring stock recovery is accurate determination of population size, differential growth, disease occurrence and mortality between oiled and un-oiled areas, and migration of potentially genetically damaged fish from affected areas to unaffected areas. ADFG currently relies mainly on inseason aerial surveys and test fisheries and post-season on spawner deposition and age-structured modeling to determine the size of the returning herring population in Prince William Sound. These same techniques combined with samples of fish from the commercial fishery provide information on the age composition, size and weight at age, fecundity, and location of spawning deposition. ADFG is aware these stock assessment tools are subject to error which may vary from year to year depending on stock size, level of commercial fishery, and environmental conditions. Not enough is known about the physical and biological factors that determine early life survival or those that control adult maturation and spawning. For example, the 1988 year class appeared particularly strong in 1992 as four year-old fish and then unexpectedly declined drastically at age five and further at age six in stark contrast to the population dynamics of similar strong year classes in the recent past which persisted in the population through age seven.

Currently ADFG places its greatest reliance on spawner deposition surveys to provide a means of back-calculating the spawning biomass of herring each year. When combined with the commercial harvest, this estimate provides the overall annual run size and allows calculation of exploitation rates, and inputs into the age-structured stock assessment model to predict next year's run size and possible commercial harvest. The accuracy of these population estimates drives the predictive process. Skip-spawners (herring that return but may not spawn), the spread of the geographical location of spawning, and the distribution of the commercial fleet all may affect the accuracy of these estimates.

Large-scale coded wire tagging would provide an additional useful tool to estimate population size while providing important additional information on growth, health, fecundity, and migration patterns of herring.

The objectives of the proposed project are to:

1. develop a large-scale coded wire tag release and recapture program for herring in PWS,

2. create a coded wire tag return database that would be available to researchers working in Prince William Sound and other areas,

3. assist researchers in analyzing coded wire tag returns to answer specific questions for research and management.

NEED FOR THE PROJECT

The declining herring stock in Prince William Sound is creating an economic hardship for commercial fishers and the communities that depend on the harvest of this resource. Herring is an important food source throughout all stages of its life history for many other important species in Prince William Sound. Reduction in the stock size of herring may inhibit the recovery of other fish, birds, and marine mammals.

ADFG budget constraints do not allow the initial capital outlay for development of such a project. However, once in place with equipment purchased, technicians trained, and databases developed, ADFG may be able to continue a large scale herring tagging program beyond the end of the proposed project period.

PROJECT DESIGN

Experts from Natural Resources Consultants and Northwest Marine Technology along with support from ADFG will develop a coded-wire tagging program for Prince William Sound. Historical harvest and spawning patterns will be reviewed, fishers and processors will be contacted, researchers and fishery managers will be interviewed, and a detailed tag release and recovery plan developed.

Recently developed statistical procedures using marked-tag recovery techniques on large-sized fish populations require far fewer tag releases and recoveries than the traditional Petersen estimates (see attached description). We anticipate that four Mark-4 tagging units would be purchased (or borrowed from ADFG salmon tagging programs). Northwest Marine Technology has achieved tagging rates from 800 to 1,000 herring per hour with the Mark-4 units in the North Atlantic. The units would be completely self-contained and portable. They could be used together on a tagging vessel or spread separately throughout the Prince William Sound area.

Live herring for tagging will be obtained from test fishery purse seiners, chartered commercial seiners prior to and after fishery openings (or during the entire 1995 season when no commercial fishery is expected), and from pound herring prior to release. The latter source would provide evidence of the relative survival rate of herring used in the pound fishery which could result in management allowing an expansion of this fishery. Assuming that each Mark-4 tagging unit was kept busy for a conservative ten hours per day over a ten day period each season, it is not unreasonable to estimate that up to 300,000 herring could be tagged and released each season. Using recently developed large population mark and recapture population estimate techniques, as few as 60,000 tagged fish may need to be released to get a reasonably accurate estimate of the population size.

Herring are processed at approximately four locations in Prince William Sound each year. Processing lines would have NMT large volume detection units installed. These units have been proven in other large-scale fisheries such as North Atlantic herring. They detect coded

wire tags under a continuous flow of fish and divert a "batch" of fish that are then further scanned for tags with a smaller volume automatic detector or by use of a hand-held detector. The four detection units proposed for the study should be able to scan a majority of the herring processed in Prince William Sound each year for coded wire tags. In 1995, the project will focus on maximizing tag releases. In 1996 and 1997, the project will focus on both tag releases and recoveries.

A computer tag release and recovery database will be developed by the team using input from ADFG, NMFS, and researchers active in Prince William Sound and other areas where the data may have application. Additionally, tag data use support services will be offered to all interested researchers and managers. These support services will include specific sample design, access and instruction in the use of the database, and a dial-in computer bulletin board format for information on tagging data availability and downloading protocols. At the termination of the three year project all tagging equipment and the coded wire tag database will be supplied to ADFG for continued operation.

PROJECT IMPLEMENTATION

The project will be conducted by Natural Resources Consultants and Northwest Marine Technology. Mr. Jeffrey A. June and Mr. Guy Thornburgh will develop the tag release, recovery, and tag reading program in conjunction with the representatives from the ADFG.

Dr. Greg Ruggerone, Dr. Gary Morishima, and ADFG to develop the coded wire tag database structure and outside research and management information support.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The project team will integrate the project design, tag release, tag recovery, and database utilization with any other relevant ongoing or planned projects in the area. The team will assist other researchers and fishery managers in integrating the information collect in the herring coded wire tagging project into their studies and make available the herring coded wire database to all interested users. In addition to studies directed at herring, the coded wire tag program could be useful in a variety of other studies ongoing in Prince William Sound. For example, coded wire tags from herring could even be hand-scanned for in fish, mammal, and bird stomach or scat studies to provide additional information on feeding habits.

FY 95 BUDGET ($K)

Personnel	20.4
Travel	0.0
Contractual	194.8
Commodities	0.0
Equipment	0.0
Subtotal	215.2
Gen. Admin.	16.7
Total	231.9

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Community Involvement and Use of Traditional Knowledge

Project Number:	95052
Restoration Category:	General Restoration (new)
Proposed By:	ADNR
Cooperating Agencies:	ADFG, USFS, DOI
Cost FY 95:	$230,500
Cost FY 96:	$248,400
Total Cost:	Unknown
Duration:	5 years (project could be 1-year only, or multi-year as expand to other communities in the spill area)
Geographic Area:	Oil spill area
Injured Resource/Service:	Subsistence

INTRODUCTION

The *Exxon Valdez* oil spill in 1989 caused severe disruption of the lives and perceptions of many spill area inhabitants and communities about their surrounding environment. Scientific studies have occurred throughout the spill area with researchers mostly based in agencies or institutions in Anchorage, Fairbanks, or outside Alaska. Data is collected under research strategies dictated by generalized knowledge of local environments but with little detailed historical knowledge. That lack of knowledge frequently diminishes application of results to specific local needs. It intensifies the frustration of local subsistence users and sense of loss of their historic lifestyle.

Traditional knowledge is used for this project to describe personal observations by people living in the spill area and knowledge which has passed from generation to generation by members of communities who share a common cultural heritage. This project intends to develop a multicultural partnership between the people of the oil spill region and scientific investigators carrying out detailed studies of the ecosystem of the region.

One Elder of the village of Tatitlek was noted as saying that, while flying to Tatitlek from Chenega Bay, he could see the bottom in places where it had not been evident before and he wondered what effect this obvious lack of plankton would have on the salmon runs. He made this observation in 1992 and again in 1994. Another example of local knowledge based on observations of past local conditions was recognition of the lack of herring spawn on seaweed in Tatitlek Narrows which is gathered each year by the local people. Herring spawn is an important part of the spring diet and valued delicacy of Tatitlek people. This is the type of traditional knowledge that would be valuable in understanding the long term effects of the *Exxon Valdez* Oil Spill.

NEED FOR THE PROJECT

Researchers have recognized that local residents have traditional knowledge that could help them answer questions they have not been able to answer through conventional scientific means. For example, people living in the spill area have detailed knowledge about condition of resources, including seals, eel grass beds, archaeological sites, etc., which can significantly add to data of scientific studies and enhance application of results. Local people have stated their desire to add local knowledge for the benefit of researchers and be involved in all stages of projects. Presently there is no mechanism to bring the two groups together to share their knowledge. The project will initiate a mechanism and protocol for accomplishing those goals. Much of the documented damage and related research has been in the Prince William Sound and Outer Kenai Peninsula areas and the initial phase of this project will focus there. Successful implementation of the FY95 program will be followed by expansion to other communities, especially the Kodiak area, where scientific research and traditional knowledge can complement each other.

PROJECT DESIGN

A. Objectives

The objective of the project will be to aid science project researchers to involve the local people into their studies either by making use of unique local knowledge, incorporating research aims which are locally important, and facilitating feed back of study results to the appropriate study area residents.

B. Methods

In each of three pilot communities a local person will coordinate efforts of knowledgeable local people, arrange local support and equipment for scientific investigators and communicate back to the local community the information and findings generated by scientific investigations in the local area. The local coordinators will be selected based on their knowledge of local natural and cultural resources. They will receive a part-time salary and will be selected and paid by the

contracted area wide coordinator. The area wide coordinator will be selected by evaluation of proposals solicited by RFP and appraised by a panel of agency resource specialists.

This project will be structured on the stewardship concept with a contracted spill-area-wide coordinator who works with local community coordinators to assure comparability of aims, policy and procedures between the local programs. The first year of the project will involve three communities, to refine the process and provide a pilot program to be expanded to other communities in subsequent years. A listing of all scientific studies funded by the Trustee Council during FY95 in the area of each village will be compiled. Also a list of local knowledgeable people and people able to provide support on contract will be assembled by the local coordinator. That list will be provided to the overall coordinator who will provide it to researchers. The local coordinators will also be responsible for compiling information and sources of additional local information about spill affected resources other than just the resources subject to current scientific research. That will allow local residents to help identify important research questions related to the spill.

Reimbursement of local participants will be arranged, if applicable, between the local participants and scientists conducting studies in the area. The local coordinator will act only as a facilitator to help investigators find locally knowledgeable informants and operators equipped for support services if required.

A contracting officer representative will assist the contractor to comply with agency contracting requirements and act as liaison between the agency and the contractor.

Local coordinators will be selected and brought into Anchorage to attend a meeting tentatively scheduled for January 1995 to share findings of various scientific projects. Immediately prior to or after the general meeting, local coordinators will meet to plan implementation of the Community Knowledge Transfer project in the selected communities.

Proposals submitted in response to the Request for Proposals will detail how the local coordinators will function, which communities will support the program and a sample of how lists of client scientists and similar lists of local resource people will be maintained. The proposals will be reviewed by a committee of agency specialists including scientists familiar with investigations in the spill area of the different resources and an individual representing local interests. The kinds of data the project should cover are, for example, fish, sea mammals, birds, intertidal habitat, and archaeological sites which are among the many studies being proposed for FY95. Proposals will be submitted in the format of detailed work plans including a narrative describing the program proposed and details of the proposed budget.

C. Schedule

November 15, 1994	RFP Published; 30 day response to RFP
December 15, 1994	Proposals evaluated and contractor selected
January 15, 1994	Oil spill science meeting/training for local coordinators
February 15, 1995	Study lists to communities
March 15, 1995	Local lists to researchers
July 1, 1995	Project status report to Trustees
September 30, 1995	Final project report

D. Technical Support

No technical support will be necessary for the project as it is a coordination project between local people and projects each with its own technical support requirements.

E. Location

This project is located in the Prince William Sound and Lower Cook Inlet areas. The communities proposed are Tatitlek, Chenega Bay, and Port Graham.

PROJECT IMPLEMENTATION

This project should be implemented under contract with a group or individual experienced in coordinating studies in the rural communities of the oil spill area. The contractor should have training in social sciences and experience in cultural anthropology or sociology. The contractor should also be familiar with traditional environmental knowledge.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This is a coordination project rather than a research project and as such is directly aimed at integrating research studies with local informants and resource users.

FY 95 BUDGET ($K)

Personnel	55.0
Travel	18.0
Contractual	139.5
Commodities	0.0
Equipment	0.0
Subtotal	212.5
Gen. Admin.	18.0
Total	230.5

Movement of Larval and Juvenile Fishes within Prince William Sound

Project Number:	95057
Restoration Category:	Research (new)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	NOAA
Cooperating Agency:	ADFG
Cost FY 95:	$328,100
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

Prior to the *Exxon Valdez* oil spill, there had been no baseline studies conducted to document presence, absence, distribution or abundance of larval or juvenile fishes in Prince William Sound (PWS). As a result of research conducted following the oil spill in 1989 several important issues regarding the fate of larvae and juveniles have arisen. McGurk et al. note that future research on early life history should be designed and conducted in order to answer questions related to fisheries ecology and management. An ecosystem approach addresses questions about fishes such as predator/prey relationships, physical processes affecting natal habitat, environmental factors controlling recruitment, the relationship between transport of larvae and surface and subsurface currents in the sound, and location and condition of juveniles in the winter. This study proposes to fill the gap between SEA and the Forage Fish and Seabird and Mammal studies by following patches of herring and other larval fishes on transit through PWS to identify areas of aggregation used as juvenile nurseries.

Forage fishes (herring, pollock, sandlance, capelin, northern smoothtongue) are the target species of this study. These species are important food for marine birds and mammals which are listed as not recovering. Additionally, Pacific herring is one of the species listed by the EVOS Trustee Council as damaged and not recovering. This species experienced poor recruitment in 1993, when the 1989 year class would have been expected to enter into the fishery. In addition to low returns, herring have been plagued with VHS, a viral disease which contributed to sound-wide failure of the herring fishery in both 1993 and 1994.

NEED FOR THE PROJECT

Knowledge of dispersal of the larval stages of fishes is a significant gap in understanding the life history of forage fishes. Dispersal of herring and pollock larvae in 1989 indicated that larvae move from northeast to southwest through the sound with the current, analogous to the path followed by the oil following the *Exxon Valdez* oil spill. This suggests that larvae may exit PWS and recruit as juveniles to areas downstream, i.e., Kenai Peninsula and Kodiak Island. One year of well-designed fisheries and physical oceanographic studies are needed to confirm this. Knowledge of the movement of larvae through the sound can be used to identify areas where juveniles aggregate, both within and outside -the sound. After year one, these results will be used to efficiently design sampling in key areas important for rearing juvenile fishes.

An ecosystem approach is needed now because lack of such an approach immediately following the oil spill is causing interpretation of some of the previous data to be questioned. A conclusion of the 1989 larval fish study was that movement of larvae is related to current patterns in PWS, but flow patterns are more intricate than indicated by the pathway taken by the *Exxon Valdez* oil. Peer reviewers of papers submitted based on those results questioned the interpretation of winds and currents acting in the same way on oil slicks and larvae in the water column because comprehensive associated oceanographic data were lacking. Additionally, larval herring collected in oiled areas of PWS following the *Exxon Valdez* oil spill which experienced morphological and cytogenetic damage are being questioned. Unfortunately, the relationship between damaged herring and spilled oil cannot be directly made because, without the supporting oceanographic data, we can only infer but not prove the larvae moved through oiled areas. Peer reviewers have cited these as "interesting observations...tempting to make the association ...cannot be justified because we do not know which larvae may or may not have been exposed to oil...situation is compounded by the lack of baseline data."

Currents in PWS may create differential affects on larvae depending upon their spawning location. If larvae from the southern spawning grounds disperse at a faster rate than larvae from northern spawning grounds, that may indicate habitat for juveniles is concentrated in the northern half of the sound. Using a coordinated oceanographic-based ecosystem approach we intend to determine what percentage of larvae may be transported out of the sound. The amount and timing of wind and buoyancy-driven flushing of the upper layers of PWS during April and May will have a significant effect on larvae. When the sound is acting like a "river" larvae may quickly be passed through the sound resulting in nursery areas downstream in locations as far as the Kenai Peninsula. When the sound is acting like a "lake" larvae may be

retained in the sound and thus be dependent upon food available within the sound. By learning where the larvae are transported, we can determine the location of nursery grounds and use that information to efficiently design future studies.

PROJECT DESCRIPTION

A. Objectives

The overall objective of this project is to understand the distribution and abundance and the resulting interannual variability in successful year classes of fishes in PWS. This can be accomplished by examining the fish in the context of their total environment including the meteorology and oceanography driving the system and the biology of the lower trophic levels which act as food for fish larvae. The larval fish aspect of the ecosystem study will achieve the following objectives:

1. To identify and count all larval fishes collected.

2. To determine the relationship between observed distribution of fish larvae and broad scale oceanographic patterns.

3. To use patches of herring larvae as markers and follow them from beach deposition throughout their passage within PWS.

4. To determine if local oceanography differentially affects herring larvae spawned at separate locations.

5. To project the locations of nearshore nursery areas for age-O fishes from the movement of the larvae coupled with the oceanographic conditions.

B. Methods

The logistics of this project will be in cooperation with the other components of the proposed ecosystem study, therefore specific needs for vessels are not included here. The assumption is that there will be a vessel available with capabilities for towing a Tucker trawl (1 m2 plankton net) and that the vessel will concurrently be used by this fisheries oceanography project and the physical oceanography project.

Herring was the third most abundant larval fish collected in PWS in 1989, but it is the only one for which we can identify spawning areas. Therefore, herring larvae will be used as markers and their movement will be followed throughout the sound. Immediately following deposition of herring eggs in April 1995 two patches of larvae will be tracked. These two patches of herring which originate in different areas of the sound will be followed to determine the effect of local oceanography on recruitment success. Comparisons of herring from two different areas will reveal if local oceanography affects survival of larvae from separate locations disparately. A

major spawning site in the northeast portion of the sound and one near Hinchinbrook Entrance or Montague Strait will be identified and herring larvae from those key sites will be followed as they move through the sound. Sample locations will initially be based on ADFG overflights to identify spawn deposition.

Patches of larvae will be identified and sampled on a scale of daily to weekly or longer, dependent upon weather conditions and speed of patch movement. Sampling of two separate patches of larvae will be coordinated so that they are not sampled simultaneously and the same boat is used for all sampling. One or more drogues (in component of Physical Oceanography - 94320M) will be released into each patch as transport away from the beach begins. Current speed and direction will be measured using an Acoustic Doppler Current Profiler (Physical Oceanography - 94320M). Sampling for larvae will continue through July, thus encompassing the season of larval herring, pollock and capelin growth and movement through the sound.

To relate the observed distribution of larvae to broad scale oceanographic patterns of flow, sampling transects will be in line with the water flow. Each sampling day a transect will be run from outside the trailing edge of the patch, through the patch, to outside the leading edge. The trailing edge of transects on successive days will overlap the leading edge of the transect the day before. Net sampling in conjunction with drogues will be used to define the 2-dimensional size (long axis) of the patch. A minimum of five stations will be sampled per day, two outside and three inside the patch. As patches of larvae disperse with time and become larger, more stations will be sampled per day. Estimating the latitudinal extent of the patch will be dependent upon sophisticated hydroacoustic methods (Nearshore Fish - 94320N). Net tows will be used in conjunction with hydroacoustic methods to determine the vertical distribution of the target species. Net tows will also be used to groundtruth the hydroacoustic data by providing species composition, relative abundance and size data as all larvae will be identified and counted.

Sampling for larval fishes will be done with a Tucker trawl with mesh nets. Except for those tows used to determine vertical distribution of larvae for use with the hydroacoustics, all samples will be oblique tows covering the upper 50 m of the water column because 95% of larvae captured in May and June 1989 were in that depth range. Sampling for older juvenile fishes will require a different net to be designed, tentatively it is planned to be a small mesh seine and will be coordinated with the Nearshore (94320N) component.

As larvae metamorphose into juveniles, they are expected to move into nearshore nursery areas. An advantage of following a patch of larvae is to use the patch to locate nursery areas. Juvenile fishes will be sampled with nets and hydroacoustics (Nearshore Fish 94320N) in nursery areas along with concurrent oceanographic measurements of temperature and salinity with a CTD and water movement with an ADCP (Physical Oceanography 94320M). These data, together with information on the structure of the area (e.g. depth, distance offshore) will be used to classify the nursery habitat utilized by juvenile fishes. Characterization of juvenile habitat coupled with transport results can be used to project locations of nursery areas for forage fishes around and outside of the sound. These areas can then be investigated later in the season by the Forage Fish project and by the Nearshore Fish (94320N) project to determine which locations produce the most successful recruitment.

Fish will be separated from zooplankton and rough sorted to family groups by undergraduate students at UAF. Fish will be identified to species in Fairbanks by Michele Frandsen who is skilled in the identification of PWS fish larvae having ID'd all the larval fish collected in PWS in 1989. The standard length of all fish will be measured using a Wild MZ3 dissecting microscope and image analysis system (Bioquant) interfaced to a computerize data base (RBase). This process simultaneously enumerates the larvae as the length data are stored. Length will be measured for a subsample of individuals of each fish species. The precise age of a larva, in days, combined with hydrographic data can provide estimates of advection rates. Age of herring larvae can be determined in days and growth can be estimated following the methods of McGurk. Growth rates between sites and among years will be compared using an ANOVA. Because aging of daily growth rings in larval herring is time consuming it will only be employed on a small subsample of herring collected. For a larger percentage of herring larvae, we will employ a method of morphological staging. There is an overlap of size between substages, giving information concerning development of larvae along with size frequency. These data can expand the information gained from the smaller subsample of larvae which were aged.

A subsample of herring larvae will be examined for morphological deformities and assigned a Graded Severity Index analogous to that performed on the 1989 samples. A subsample of that will be sent to JoEllen Hose (Occidental College, Los Angeles, CA) for cytogenetic analysis. We expect the data obtained in herring larvae in 1995 to be within the morphologic and cytogenetic baseline range for normal larvae as newly hatched larvae in 1990 and 1991 fell within this range. However, older larvae have not been examined subsequent to 1989. It is expected that these samples will provide a baseline with which to compare 1989 and will validate the results obtained from 1989 samples.

All larval and juvenile fishes will be counted and measured. Distribution and abundance of each species of forage fish will be analyzed in relation to the oceanographic parameters and transport of larvae will be determined. From that, an estimate of retention of larvae within the sound will be made.

C. Schedule

November 1994 - January 1995
Write detailed study plan, coordinate with all companion projects and investigators based on results of 1994 sampling.

January - March 1995
Stage for FY95 field season.

April - August 1995
Field work in Prince William Sound, begin sorting and identification of larvae.

August - September 1995
Continue sorting and identifying larvae. Preliminary analysis of data.

For FY 1996, a continuation of this project will be requested to complete the workup of larvae and analysis of data. Only minimal field sampling will be required in 1996 because results of 1995 will be used to predict where the patch should move where the juvenile nursery areas should be.

D. Technical Support

This project requires strong supporting projects from the Prince William Sound Science Center (Physical Oceanography - 94320M and Nearshore Fish 94320N), Alaska Department of Fish and Game Spawn Deposition Study and ADFG Juvenile Herring new proposal). A subcontract to JoEllen Hose, Occidental College, Los Angeles, CA for cytogenetic analysis of herring larvae. Dr. Hose developed the techniques and conducted the analyses on the 1989 herring larvae.

E. Location

Sampling will take place in Prince William Sound. If there is significant transport of herring larvae out of the sound, it will be necessary to follow them along the Kenai Peninsula.

PROJECT IMPLEMENTATION

The lead agency on this project is proposed to be the University of Alaska Fairbanks because Brenda L. Norcross at UAF has the expertise to sample, identify and analyze larval fishes from Prince William Sound. She was the PI on a related project in PWS in 1989 and is familiar with the sampling techniques and the sample area. Having analyzed the previous data, she will use that information to design the study plan for the proposed study.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The proposed study is coordinated with the integrated Prince William Sound Ecosystem Assessment (SEA) which was initiated in 1994. This project is designed as an interdisciplinary study which focuses on transport of herring larvae but is dependent upon results of the concurrent Physical Oceanography (94320M) and Nearshore Fish (94320N) projects through shared data and resources and integrated sampling plans. This study will use results generated by Zooplankton in the Ecosystem (94320H), Phytoplankton and Nutrients (94320G), Avian Predation on Herring Spawn (94320Q) projects and the VHS study which was initiated in April 1994 on an emergency basis. This proposed study will contribute nursery area information to the newly proposed Juvenile Herring study and. The information gained from this proposed study will contribute to the PWS Herring Recruitment Model (new proposal). It will also be coordinated with the ongoing herring spawn deposition studies funded by ADFG and will be integrated with the newly proposed Food Limitation of Seabirds (NBS), Forage Fish (NMFS) and Marine Mammals (ADFG) studies. As part of this proposed project, Dr. Norcross will work directly with the PI's from the other project to integrate her results into their research.

FY 95 BUDGET ($K)

Personnel	173.0
Travel	21.4
Contractual	21.6
Commodities	18.8
Equipment	15.8
Indirect Costs	50.0
Subtotal	300.6
Gen. Admin.	27.5
Total	328.1

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Restoration Assistance to Private Landowners

Project Number:	95058
Restoration Category:	Habitat Protection (new)
Proposed By:	USFS and ADFG
Lead Trustee Agency:	ADFG
Cooperating Agencies:	USFS, ADNR
Cost FY 95:	$423,700 (includes $68,500 for data analysis and report writing of FY 94 work)
Cost FY 96:	$0
Total Cost:	$423,700
Duration:	1 year
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

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

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

NEED FOR THE PROJECT

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

PROJECT DESIGN

A. Objectives

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

2. Identify critical requirements of the key habitats of injured resources or services.

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

4. Contact private landowners to review development plans, discuss restoration options, and develop specific project proposals or funding requests.

5. Develop an annual report of various enhancement/restoration options for the Trustee Council to implement.

6. Prepare short and long-term maintenance and management plans (or agreements) for all Trustee Council-sponsored projects.

7. Develop a bibliography of best management practices, mitigation, and enhancement techniques for restoring injured resources/services that can be integrated with the *Exxon Valdez* Information Management System.

B. Methods

In addition to educating landowners on ways to protect injured resources and services, four different approaches are planned: enhancement, mitigation, reclamation/revegetation, and

monitoring/research. Examples are provided below.

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

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

Reclamation/rehabilitation projects:
- modifying planting techniques or plant species to accelerate revegetation;
- tree planting to accelerate forest maturity;
- removing or repairing perched culverts; and
- removing, stabilizing or revegetating discontinued logging roads.

Monitoring/research projects:
- evaluating the effectiveness of various mitigation techniques;
- inventorying injured species habitats; and
- assessing habitat quality as a function of on-going development activities.

As a practical matter, emphasis will be placed on projects that are cost-effective and immediately beneficial for restoring or enhancing injured resources and services. For example, timber operators could construct fish passes for injured pink salmon or expand the size of stream buffers to protect harlequin duck nesting as harvest operations are occurring in the field. This would minimize the cost of transporting personnel and equipment to remote sites and provide additional and immediate restoration benefits for these species.

C. Schedule

October 1, 1994 - June 1, 1995

Project planning, includes a survey of agency responsibilities and development recommendations, best management practices and current mitigation techniques, key habitat and use requirements for injured resources and services. Meetings with private landowners to develop restoration options. Presentation of restoration options to the Trustee Council.

Preparation of NEPA documents for public review and Record of Decision, as appropriate.

June 1 - September 30, 1995

Field inspections of potential project sites. Monitoring of construction or development activities to achieve restoration objectives. Continued meetings with landowners to identify additional opportunities for restoration. Preparation of project summary report for Trustee Council.

D. Technical Support

Technical support will be needed in the fields of forest ecology and management, project permitting, fisheries biology, wildlife conservation, mapping, and GIS.

E. Location

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

PROJECT IMPLEMENTATION

The project will be conducted as a cooperative effort between USFS and ADFG. Each agency has extensive experience in permitting timber harvests, mining, and other development projects on state and federal lands. Both agencies have worked together to design and implement restoration and enhancement projects for fish and wildlife.

COORDINATION OF INTEGRATED RESEARCH EFFORT

As noted, the project will be a coordinated effort between the USFS and ADFG. In addition, the project will utilize data and expertise from the Trustee Council's Habitat Work Group and produce a bibliography that can be integrated into the *Exxon Valdez* Information Management System.

FY 95 BUDGET ($K)

Personnel	242.0
Travel	18.0
Contractual	90.1
Commodities	13.5
Equipment	13.0
Subtotal	376.6
Gen. Admin.	47.1
Total	423.7

River Otter Recovery Monitoring

Project Number:	95062
Restoration Category:	Monitoring (new)
Proposed By:	ADFG
Cost FY 95:	$55,900
Cost FY 96:	$0
Total Cost:	$55,900
Duration:	1 year
Geographic Location:	Northern Knight Island and Esther Passage, PWS
Injured Resource/Service:	River otter

INTRODUCTION

River otters (*Lutra canadensis*) suffered direct mortality during the *Exxon Valdez* oil spill. A river otter damage assessment study in PWS conducted during 1989-92 documented subsequent long-term sublethal effects. No monitoring was done during 1993 or 1994, and therefore, recovery status is unknown. Monitoring of latrine sites that was begun during the damage assessment study will be continued for one additional year to establish an index of otter abundance that can be used to help assess recovery.

Signs of injury included changes in home range size, habitat use, and latrine abandonment. Home ranges of otters from oiled areas were twice as large as those from unoiled areas. Otters from oiled areas selected habitat differently. Latrine sites, which are an index to abundance, were abandoned more often in 1991 in oiled than in unoiled areas, suggesting there may have been a delayed response in river otter populations from exposure to crude oil. Differences in rates of fecal deposition between oiled and unoiled latrine sites in Herring Bay suggested otters used heavily-oiled areas less often.

Effects from exposure to crude oil were also indicated in blood and fecal samples. Increased levels of haptoglobins and interleukin were found in the blood of live-captured otters from oiled areas as compared to unoiled areas one and two years after the spill. Elevated levels of these blood values indicate trauma and a weakened immune system. Male river otters in 1990 had significantly lower body mass in oiled areas. By summer 1990, there were significant declines in the number of species in otter diets in oiled areas. Relative abundance of prey remains in otter feces showed strong differences between oiled and unoiled areas.

NEED FOR THE PROJECT

The restoration objective for river otter is a return to prespill habitat use, food habits, and physiological indices. The primary strategy for achieving this objective is to rely on natural recovery, to monitor that recovery, and to protect otters and their habitats. This project will provide the population monitoring information called for in the restoration strategy. It will also provide information essential for assessing the need for additional otter protection. Current trapping seasons in the oiled area may be curtailed or closed if the population is not recovering.

PROJECT DESIGN

River otter latrine sites are activity centers that provide the opportunity to monitor population trends and provide insights into the lower trophic levels that support otters. Once established by otters, sites are seldom abandoned unless significant changes occur in otter density or habitat. In 1991, latrine sites in areas within the path of the spill were abandoned at nearly four times the rate documented in unoiled areas. During the previous damage assessment study, intensive study areas were established in oiled and unoiled otter habitat. All latrine sites that were found in the two intensive study areas are available for continued examination in this study. Use of these sites by otters in 1990 and 1991 is documented and will provide the base for quantifying differences in otter use. Use will be compared in the oiled and unoiled study areas, and changes over time since the oil spill will be determined. Monitoring of latrine use will provide information on population trends within both study areas. The population trend within the oiled study area can be used as an indicator of the status of otter populations in other areas impacted by the spill. Trend data from the unoiled area will be necessary to separate the effects of weather from residual impacts of oil on population trends.

A. Objectives

1. Determine the annual level of latrine site use by river otters in the northern Knight Island study area and compare that use with data from the Esther Passage study area.

2. Monitor the annual harvest with emphasis on harvest size and the presence or absence of subadult animals from area impacted by the spill.

B. Methods

Methodology for cleaning otter scats and for determining latrine site abandonment will follow those used previously in the river otter damage assessment study. The same intensive study areas will be monitored. Field investigations of approximately two weeks each will occur in early June and September. During June, latrine site use or non-use will be determined and scats will be cleaned from the site. In early September, use or non-use will be determined.

Areas used as latrine sites are readily recognizable and have been identified in previous research. In addition to fecal droppings, otters keep the trails and a core area free of non-woody vegetation and light litter fall from the forest canopy. By summer, a lack of continued use will produce regrowth of vegetation and many small branches laying in formerly cleared areas. Also, lack of use will mean no scats will be deposited after the cleaning in early June. The trend in latrine site use will be determined and used as an indicator of the trend in otter population.

Trappers are required to bring river otter pelts to Alaska Department of Fish and Game for harvest sealing. Department fur sealing records for Game Management Unit 6 will be reviewed. Hide measurements may provide data on reproductive success. If sample size is adequate, it may be possible to identify subadults and evaluate recruitment into the population.

C. Schedule

Feb. 1 1995 Equipment and materials purchase. Initiate vessel charters and hiring of personnel.
June 1-14 First field trip; visit latrine sites to clear scats and determine use or non-use.
June 15-30 Field and harvest data analysis.
Sept.1-14 Second field trip; visit latrine sites to determine use or non-use.
Sept.15-30 Final report production.

D. Technical Support

No technical support required.

E. Location

Project study areas are northern Knight Island and Esther Passage.

PROJECT IMPLEMENTATION

Project should be done through competitive contract.

FY 95 BUDGET ($K)

Personnel	17.3
Travel	1.0
Contractual	29.5
Commodities	2.5
Equipment	0.9
Subtotal	51.2
Gen. Admin.	4.7
Total	55.9

Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in Prince William Sound, Alaska

Project Number:	95064
Restoration Category:	Research (continuation of 94064)
Proposed By:	ADFG
Cost FY 95:	$347,100 (includes $114,700 for data analysis and report writing)
Cost FY 96:	$338,400 (includes $113,000 for data analysis and report writing)
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Harbor seal

INTRODUCTION

This restoration monitoring and research proposal is written in collaboration with the interdisciplinary and integrative Marine Mammal Ecosystem program submission to the EVOS Trustee Council. Harbor seals are a non-recovering biological resource whose status affects subsistence uses and commercial fishing, both services which were negatively impacted by the EVOS. As outlined under the broad program direction, the goals of the combined collaborative Marine Mammal Ecosystem projects are to investigate, in an ecosystem context, the reasons for the long-term decline in harbor seals and their lack of recovery following the EVOS. In particular this project will focus on four questions which have been identified as the most likely explanation for the failure of harbor seals to recover following the EVOS: Is it food? Is it predation? Is it human impact? Is it disease?

Harbor seals (*Phoca vitulina*) occur year-round in Prince William Sound (PWS), where they pup, breed, molt, and feed. During extensive surveys of PWS in 1991-1993, 2,500-2,900 harbor seals were counted on haulouts. Another 1,700 were counted in the Copper River Delta and Orca Inlet. From 1984-1988, harbor seal numbers at trend count sites in PWS declined by over 40% due to unknown causes. In 1989, the decline was exacerbated in oiled areas by the *Exxon Valdez* oil spill (EVOS). More than 300 seals (36% of the seals in oiled areas) were estimated to have died in PWS because of the spill. Inhalation of light aromatic compounds, which caused brain damage that led to drowning, was the most likely cause of death. During molting-

period surveys in 1993, there were 51% fewer seals at oiled trend count sites than there were in 1988, compared to 11% fewer at unoiled sites. For all PWS trend sites combined, there were 27% fewer seals in 1993 than in 1988, and 57% fewer than in 1984. The reasons for the ongoing decline, and the lack of recovery from the EVOS, are unknown.

Harbor seals are an important subsistence resource. In 1985-1988, they made up 13%-27% of the subsistence foods harvested in Tatitlek and Chenega Bay. Since the EVOS, the number of seals harvested by subsistence hunters in PWS has declined by over 60%. Harbor seals interact with and are incidentally killed in commercial fisheries. Like all marine mammals, they have federal protection under the Marine Mammal Protection Act (MMPA). Because of the ongoing decline, they are currently being considered for listing as depleted under the MMPA. It is essential that current population data be available, as well as information about what may be causing the decline, so that inappropriate restrictions on human activities are not implemented.

This project is a continuation and redirection of a harbor seal restoration study that his been conducted by ADFG since 1992. The ongoing study has consisted primarily of recovery monitoring and satellite tagging of seals to determine their movements, use of haulouts, and diving and haulout behavior in PWS. The proposed 1995-1997 study will build upon previous research findings and incorporate new components to address high-priority issues regarding harbor seal recovery.

The ADFG study will have five key components: 1) Restoration Monitoring - Harbor seal numbers will be monitored during pupping and molting periods at 25 trend count sites in PWS to determine whether or not recovery is occurring; 2) Habitat Use - Seals will be instrumented with satellite tags (PTTS) in 1995 and 1996 to investigate habitat use, movements, and diving and haulout behavior; 3) Trophic Interactions - Fatty acids in blood and blubber of harbor seals and in prey species will be compared and relative frequencies matched to provide an indication of diet and to elucidate food webs in PWS; 4) Demographic Modeling - The effects of killer whale predation, subsistence harvest, and other mortality on the harbor seal population in PWS will be modelled in order to evaluate whether any of these factors may be inhibiting recovery; and 5) Disease and Genetics - Blood serum samples will be analyzed for phocine distemper, herpes virus, and other diseases that could cause health problems in the seal population. Skin samples will be used for genetic analysis to determine the relationships of PWS harbor seals to those in other parts of Alaska.

NEED FOR THE PROJECT

Because of the ongoing decline in harbor seal abundance, which was exacerbated by the EVOS, it is particularly important to understand what factors are limiting the harbor seal population. Because of the ongoing decline and the lack of recovery in the oiled areas, we cannot assume that the number of seals in oiled areas will stabilize and/or return naturally to pre-spill levels. It is necessary both to continue monitoring population trends and to identify and appropriately manage areas or resources of biological significance in order to augment recovery in any way

possible. Native residents of PWS utilize harbor seals extensively as a source of food, and have noted the scarcity of seals and the impact this has had on subsistence hunting. Commercial fisheries in PWS may face more restrictive measures regarding incidental take of harbor seals unless something can be done to understand and reverse the population decline.

The ongoing decline of harbor seals began over two decades ago in the northern Gulf of Alaska and at least a decade ago in PWS. Although periodic surveys have documented these downward trends, they have done nothing to elucidate the cause of the decline. Unless research is specifically designed and conducted to investigate the factors limiting harbor seals, it is likely that little progress will be made in understanding the decline. Similar declines have occurred in Steller sea lions (*Eumetopias jubatus*), also for unknown reasons. For both of these species, it has been suggested that changing prey availability may be responsible. This is a difficult but important topic to investigate. It will require a multidisciplinary approach that incorporates an understanding of harbor seal behavior, habitat use, and energetics with data about the distribution, abundance and biology of prey species and predators.

PROJECT DESIGN

A. Objectives

1. Monitoring: a) continue monitoring harbor seal population trends in PWS during pupping and molting in 1995 and 1996; b) recommend a monitoring schedule for 1997 and beyond; c) evaluate whether seal numbers are continuing to decline, have stabilized, or are recovering to pre-spill levels.

2. Habitat Use: a) describe hauling out and diving behavior, and by inference, feeding behavior of satellite-tagged seals in PWS; and b) describe the use of and movements between haulouts and feeding areas.

3. Trophic Interactions: a) determine individual, seasonal, and interannual differences in fatty acid composition of lipid stores in harbor seals from PWS; b) assess variation in the fatty acid composition of prey species; c) statistically determine prey items in harbor seal diets using analyses of fatty acid signatures; and d) evaluate the relative contribution of each prey type to the overall diet using measured fat content of the prey.

4. Demographic Modelling: a) model the effects of killer whale predation, the subsistence harvest, and incidental take by fisheries on the harbor seal population; and b) evaluate how these factors may impact recovery from the EVOS.

5. Disease and Genetics: a) conduct viral screening to determine whether disease may be causing or aggravating the harbor seal decline; b) conduct genetic analysis to determine whether PWS harbor seals constitute a genetically distinct population.

B. Methods

We are proposing two years of field study (1995 and 1996) with final data analysis and reporting to take place in year three (1997). Findings from this study will be evaluated annually and modifications in study approach will be recommended in order to incorporate recent findings from this and other PWS ecosystem studies. In addition to the five components outlined in this project description, questions about health and condition, stable isotope analyses, predation by killer whales, and prey availability will be addressed by other studies included in the Marine Mammal Ecosystem package.

1. Monitoring: Harbor seal abundance will be monitored by flying aerial surveys during pupping (June) and molting (late August; September). A fixed-wing aircraft will be used to fly a survey of 25 trend count sites at an altitude of 700 ft. These 25 sites have been used by ADFG for PWS harbor seal trend counts since 1983, including NRDA and Restoration studies in 1989-1994. Replicate counts will be made at each site in allow statistical analysis of trend. Methodology and observers will be the same as in 1989-1991.

2. Habitat Use: Satellite-linked time-depth recorders (PTTs) will be attached to 12 seals per year at locations chosen for their proximity to forage fish and oceanographic stations sampled as part of other PWS ecosystem studies. Seals will be caught by entanglement in nets placed near haulouts and PTTs will be glued to their backs with epoxy resin. Each PTT will transmit signals to polar-orbiting satellites whenever the seal is hauled out or when it surfaces for a sufficient time. Sensor information will indicate when the animal is hauled out, and how deep and for how long it dives. PTTs will be shed during the annual molt in July-August.

3. Trophic Interactions: Blubber samples will be taken from seals by biopsy and blood will be collected from extradural vein. Samples will be collected from all seals that are caught during tagging operations. Prey species will also be analyzed. During year one, approximately 10 species that are known to be prey of harbor seals in PWS will be sampled during two seasons. For each species, 8 individuals of the size range consumed by seals will be collected and analyzed for total fat and protein content and fatty acid composition. During year two, prey species determined to be most important in the diet will be examined in more detail. Samples will be obtained from herring and forage fish projects.

Fatty acid methyl esters will be extracted from seal blubber and prey and analyzed using temperature programmed gas liquid chromatography. Approximately 70 fatty acids and isomers can be separated and quantified in most marine lipids. Fatty acids will be used to evaluate food webs in two ways. The array of fatty acids in seal tissues will be statistically compared to fatty acids in prey species in order to quantify the relative contribution of each prey item to the overall diet. In addition, single unusual or unique components will be used to trace a specific prey. Data will be analyzed using a multivariate model called a tree regression analysis which has recently been applied and modified for fatty acid signature analysis.

4. Demographic Modeling: A demographic model will be developed to examine the effects of predation, harvest, and incidental take on the harbor seal population in PWS. The model will use life table data from PWS harbor seals collected by ADFG in the 1970s. Data on the subsistence harvest will be provided by ADFG's Division of Subsistence, obtained in cooperation with subsistence hunters from Chenega Bay, Tatitlek, and Cordova. Information on killer whale predation will be obtained from the proposed NMML/NMFS study on Effects of Killer Whale Predation on Injured Resources, as well as from other pertinent studies. Data on incidental take in fisheries will be obtained from NMFS.

5. Disease and Genetics: Viral swabs, blood serum, and skin samples will be collected from seals caught during tagging. Disease assays from swabs or serum will be conducted by a variety of laboratories specializing in these assays. Genetics analyses will be conducted by NMFS/SWFSC.

C. Schedule

This project will be conducted during 1995 and 1996, with either a recommendation for additional field studies or submission of a final report in 1997. Aerial surveys will be conducted during 7-14 days in June and August/September. Satellite tagging, and associated sampling for lipid and stable isotope analyses, genetics, and disease work will take place during late April/May and/or September. PTTs must be ordered by January of each year. Satellite data acquisition costs must be encumbered in February. Data are received monthly and preliminary analyses will begin as soon as diskettes are received. Final analyses cannot be completed until the PTTs have ceased to function. A report of field activities will be submitted in letter form within 30 days following any field activity. The principal investigator will participate in planning workshops, as scheduled by the Trustee Council, and be prepared to present findings of this study. An annual progress report will be submitted by 15 April of each year. A final report will be submitted by 30 September 1997. Results will be prepared for publication in peer-reviewed journals.

D. Technical Support

Computer programming and biometric support will be provided by project personnel at ADFG Fairbanks. Laboratory analyses of lipids, blood, and genetics samples and viral screening are budgeted for as part of this study but will be done by agencies or institutions other than ADFG.

E. Location

Aerial surveys will be conducted of 25 established trend count sites in PWS. Seal tagging and sampling will also take place in PWS. Tagging locations will be coordinated with forage fish and oceanographic studies.

PROJECT IMPLEMENTATION

This study will be conducted by ADFG, Division of Wildlife Conservation. ADFG personnel have over 20 years of experience conducting harbor seal research in PWS, including trend count surveys and studies of natural history and diet. ADFG has conducted all previous harbor seal NRDA and Restoration Monitoring and Research studies (1989-1994). Project personnel have developed the methodology for trend count surveys and for catching and tagging seals in PWS. ADFG works closely with the National Marine Mammal Laboratory/NMFS which is the agency responsible for managing harbor seals.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is a multidisciplinary, interagency undertaking. Surveys and satellite tagging will be conducted by ADFG. Lipid analyses and interpretation will be conducted at Dalhousie University. Blood chemistry analyses will be coordinated by UAF. Genetics samples will be analyzed at SWFSC/ NMFS. Demographic modelling will be done by personnel at NMML/NMFS.

This project is part of an integrated Marine Mammal Ecosystem package. Studies in this package include this project (Harbor Seal Monitoring, Habitat Use, and Trophic Interactions); Harbor Seal Condition and Health Status (UAF); Effects of Killer Whale Predation on Recovery Rates of Injured Resources (NMML); and Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers (UAF). In addition, this study will be closely integrated with Herring (ADFG) and Oceanographic (UAF) studies being submitted under the SEA plan and with the Forage Fish study being developed by NMFS to investigate food availability to pelagic predators. Prey samples obtained by Herring and Forage Fish studies will be analyzed as part of this study. Species to be analyzed will be chosen based on their collective importance to harbor seals, seabirds, and killer whales. Modelling efforts will incorporate and build on the results of a restoration study being conducted by the ADFG Division of Subsistence entitled Harbor Seal and Sea Otter Recovery.

ADFG is conducting studies of harbor seals in southeast Alaska and near Kodiak with funding from NOAA/NMFS. Those studies contain similar components to the PWS study and are closely coordinated to ensure that data are collected and analyzed in a similar manner. This will facilitate comparisons of data from declining populations (PWS and Kodiak) and healthy populations (southeast Alaska) of harbor seals.

FY 95 BUDGET ($K)

Personnel	125.4
Travel	11.7
Contractual	123.1
Commodities	58.1
Equipment	1.4
Subtotal	319.7
Gen. Admin.	27.4
Total	347.1

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Restoration of Salmon Stocks of Special Importance to Native Cultures

Project Number:	95069
Restoration Category:	General Restoration (new)
Proposed By:	ADFG
Cooperating Agency:	USFS
Cost FY 95:	$665,700
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2 years (for this phase which targets restoration of 8 stocks; success of project will be evaluated over an additional 3 years)
Geographic Area:	Prince William Sound, Lower Kenai Peninsula, Kodiak
Injured Resource/Service:	Pink salmon and subsistence

INTRODUCTION

Pink salmon primarily spawn intertidally in Prince William Sound and to varying degrees throughout their Northern Gulf of Alaska range. Consequently eggs and pre-emergent fry were exposed to oil while they incubated in intertidal gravel following the *Exxon Valdez* oil spill (EVOS). Significant injuries were documented at the time which ultimately resulted in fewer adult returns to oiled streams, but there also appears to have been heritable genetic damage which makes successful spawning roughly twice as unlikely (up to 40% for some streams) for returning adults. The Alaska Department of Fish and Game and the United States Forest Service conducted stream rehabilitation surveys (Project 93063) in order to determine which methods of habitat or stock manipulation would be appropriate for particular streams. From these developed project 94139, Salmon Instream Habitat and Stock Restoration, which began to implement the findings of 94063. While restoration of impacted stocks and sport and commercial fishing services were considered, subsistence uses of particular stocks were not given major consideration. The currently proposed project is designed to identify stocks of particular interest to subsistence users and, where needed, apply appropriate instream habitat and stock restoration techniques using native skilled craftsmen and laborers to the extent possible under the guidance of USFS and ADFG biologists. As well as instream techniques, incubation of stocks at hatcheries to improve egg to fry survival and other hatchery involvement will be among techniques considered.

NEED FOR THE PROJECT

Many subsistence foods were impacted by the EVOS and users have been forced to substitute subsistence caught foods with commercially obtained processed foods. While some resources are recovering, use of subsistence foods has not returned to a pre-spill level and will not until subsistence resources have returned to pre-spill and appear to be free from tainting by petroleum hydrocarbons. In order to return to a more traditional lifestyle, native users have suggested a need to restore and enhance stocks of salmon returning to streams of particular interest to them. Because this is a need expressed by them and the stocks provided subsistence foods directly to them, they are interested in participating in the efforts to restore these stocks.

PROJECT DESIGN

A. Objectives

Restore and enhance salmon stocks identified by native users as depressed and of value to their subsistence life style. A target of approximately eight stocks are to be affected by this project in 1995.

B. Methods

Specific techniques are dependent upon methods deemed most likely to succeed and cost effective for particular streams. The restoration options include but are not limited to egg incubation boxes, fish barrier bypasses, spawning channels, incubation of eggs and early juvenile rearing at hatcheries with planting of juveniles in the stream of origin, capture of emergent fry at streams and short term rearing in netpens off the stream mouths. Cost benefit ratios have been conducted somewhat differently by USFS and ADFG in the past. These methods will be modified to include subsistence values.

C. Schedule

Date	Action
Nov. 1994	Request list of candidate streams from native subsistence users.
Dec. 1994	Assess appropriate restoration/enhancement techniques for up to eight streams/stocks. Begin NEPA process for those streams with known appropriate techniques.
May 1995	Complete NEPA for streams with known appropriate restoration/enhancements. Initiate requests for proposals for restoration/enhancement of these streams/stocks
June 1995	Award contracts for restoration/enhancement.
July-Sept.1995	Obtain permits, conduct restoration/enhancement actions.
Jan.-Sept.1995	Conduct surveys of streams where appropriate restoration/enhancement techniques have not been determined.
Oct. 1995	Initiate NEPA for streams surveyed in 1995.
Dec. 1995	Complete NEPA. Initiate requests for proposals for restoration/enhancement of these streams/stocks.
Jan. 1996	Award contracts for restoration/enhancement.
Feb.-May 1996	Obtain permits.
June-Sept. 1996	Conduct restoration/enhancement actions.
1996-1998	Evaluate success of project.

D. Technical Support

None anticipated at this time.

E. Location

Prince William Sound, Lower Kenai Peninsula, Kodiak

PROJECT IMPLEMENTATION

ADFG and US Forest Service will seek candidate streams, assess the appropriateness of techniques, conduct RFP's, award contracts and assess the success of the project at individual streams. ADFG and US Forest Service may conduct surveys of streams for which appropriate restoration/enhancement techniques have not been previously determined or these agencies may contract out this work. NEPA compliance will be conducted by ADFG and US Forest Service. Contracts will be awarded for actual restoration/enhancement actions. It is expected that native organizations will be employed for instream habitat manipulation and private non-profit corporations will provide any hatchery services required.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be coordinated with other 1995 pink salmon and subsistence projects.

FY 1995 BUDGET ($K):

Personnel	150.0
Travel	16.0
Contractual	400.0
Commodities	40.0
Equipment	16.0
Subtotal	622.0
Gen. Admin.	43.7
Total	665.7

Herring Reproductive Impairment

Project Number:	95074
Restoration Category:	Research (new)
Proposed By:	National Marine Fisheries Service
Lead Trustee Agency:	NOAA
Cooperating Agency:	ADFG
Cost FY 95:	$407,200
Cost FY 96:	$119,200
Total Cost:	$526,400
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring

INTRODUCTION

Herring stock in Prince William Sound (PWS) may have been reproductively impaired by the 1989 *Exxon Valdez* oil spill, and it is feared that continuing long-lasting effects could hamper restoration of the stocks that have crashed since the spill. Most or all of the life stages of herring may have been exposed to oil after the 1989 *Exxon Valdez* oil spill in PWS. Significant histopathological damage was observed in adults collected in oiled areas in 1989 and 1990 (ADFG), and over 40% of the spawning areas were oiled (ADFG). Exposure of herring eggs to petroleum hydrocarbon concentrations frequently results in abnormal larvae with poor survival potential. In the pectoral fins of herring embryos exposed to oil, anaphase aberrations was elevated, giving some credence to the hypothesis that long term genetic damage was possible to the germ line. Because year-class strength is heavily influenced by survival of herring larvae, contamination of pre-spawn adults, eggs, or larvae by petroleum hydrocarbons may have an adverse impact on herring populations. Long term effects are possible and unknown.

The primary goal of the study is to determine if herring reproduction can be impaired by exposure to oil; a combination of controlled laboratory exposures and viability measurements from herring in the field will be used. In year one (FY 94), our goal was to determine if exposure of pre-spawning adults to oil would result in genetically impaired larvae with reduced survival potential. In year two (FY 95), the laboratory oil exposures will be extended to eggs and larvae, with similar measurements of genetically impaired larvae. This will allow direct comparison of impacts between adult, egg, and larval stages. Data will be used to infer what the relative effects the *Exxon Valdez* oil spill were on adult and early life stages of herring in PWS. In addition, a field component of the study will measure the current status of herring reproduction at several locations in PWS by age class. Spawn from these herring will be returned to the lab and incubated in a stable and common environment for determination of hatching success and abnormality rates for each age class and spawning location.

The field component in FY 95 will be integrated with the two other herring components -- the age/weight/length analyses by ADFG, and the disease sampling by ADFG or independent contractor. All of the samples for each component will come from the same group of fish sampled at a spawning site.

NEED FOR THE PROJECT

Five years after the *Exxon Valdez* oil spill, questions concerning the impact of oil persist, as well as questions about the recovery potential of herring. There is evidence that exposure to oil may have caused long term genetic damage in herring; this issue has been identified as a critical by the *Exxon Valdez* Oil Spill Trustee Council. In years after the spill, recruitment to the fishable stock has been unexpectedly low, and disease incidence has been unexpectedly high. Of principal concern is whether the herring population is reproductively impaired as a result of exposure to oil. Evaluation of the extent of reproductive impairment should be possible from the results of this study. If impairment has occurred, adjustment in the management of the herring fishery in PWS may be necessary.

PROJECT DESIGN

A. Objectives

1. Determine if exposure of herring eggs and larvae causes genetic injury. This is a continuation of the three year research proposal initially funded in 1994. From estimates of somatic genetic damage, we will infer the possibility that exposure of herring to oil can cause genetic damage that is transmissible to subsequent generations. It is not practical to measure germ line damage directly in the laboratory because it is not possible to rear herring from eggs to maturity. In 1994, oil was exposed to pre-spawning adults and genetic aberrations in eggs and larvae were measured. In 1995, oil will be exposed to eggs and larvae, and genetic aberrations will be measured. Aberration rates will be compared across exposure doses and life stage exposed.

2. Survey herring in PWS for reproductive impairment by measuring larval viability by location and age class. Herring reproduction may be impaired as a result of past oil exposures at one or more life stages. In 1995, we will measure herring reproduction success from several age classes collected from several sites in PWS. Some of the age classes were exposed to oil, but post 1990 year classes were not. Spawn will be returned to the lab and reared until hatch to determine larval viability and abnormality rates.

B. Methods

1. Adult herring will be artificially spawned onto glass slides (identified by fish) or substrate contaminated with oil. Eggs will be exposed to two types of treatments - oil in water (as in FY94) and to oil contaminated substrate. One series of treatments will consist of four oil doses plus a control. For larval exposures, eggs will be incubated in clean water, and resultant larvae will be exposed to a series of doses. Chromosomal aberration rates will be the primary measurement. The number of mitoses per fin and chromosomal (anaphase) aberrations will be assessed from subsets of larvae at the point of yolk resorption. Data will also be collected to determine graded severity indices (morphological defects), condition of interphase cells, and number of degenerating cells. Several secondary parameters will be observed periodically to determine fertility, hatching, death, and larval viability. Genetic observations will be completed after preservation.

2. Herring will be collected from multiple locations throughout PWS, aged, and crossed. Additional herring will be similarly crossed from a control location, Sitka Sound. The goal is to obtain 25 fish from each age class at each location. The eggs will be incubated in individual containers at the Auke Bay Laboratory (ABL) until hatch. Larval viability will be judged at hatch for each female, age class, and location. Hatch timing, percent fertile, morphological abnormalities, and egg survival will also be recorded. Researchers from ABL will work closely with ADF&G to collect fish; age, length, weight, and VHN samples can be collected at the same time, thus integrating state and federal research objectives.

C. Schedule

1994 brood year:	Mar 1995	Finish analyses and reports
1995 brood year:	Jan-Jun 1995	Laboratory exposures
	Feb-Jun 1995	Reproductive impairment survey in PWS
	Jul-Nov 1995	Chemical and contract analyses
	Dec 1995-Apr 1996	Data analysis and final report

D. Technical Support

All egg and larval culturing and chemical analyses will be conducted at ABL. Chemists at ABL will participate in oil dosing and analysis. Computer services, data archiving, and GIS mapping are all services available in-house at the Auke Bay Laboratory. Herring researchers at ABL will work closely with ADFG to obtain herring and spawn in PWS, so that age, length, weight, and disease sampling are all from the same spawning sites. We will ask ADFG to age all of the adult herring spawned. Analysis of genetic aberrations will be contracted out.

E. Location

Herring impairment samples will be collected in PWS and at Sitka (control site). All lab exposures and rearing will be at ABL.

PROJECT IMPLEMENTATION

Project would be implemented by NOAA/NMFS/Auke Bay Laboratory with interagency cooperation with ADFG and the SEA plan. Researchers at the Auke Bay Laboratory are uniquely suited to complete this project because of their expertise and knowledge in culture and maintenance of adult, egg, and larval herring, their history of oil related research (including herring), continuity of similar research completed in 1994, and hydrocarbon analytical facilities.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is an integral component of the suite of herring studies in the SEA plan. Reproductive impairment sample collection will be integrated with herring disease and spawn deposition research.

FY 95 BUDGET ($K)

Personnel	243.2
Travel	20.5
Contractual	64.0
Commodities	33.5
Equipment	5.0
Subtotal	366.2
Gen. Admin.	41.0
Total	407.2

Relation of Mussel Population Structure to the Recovery of Injured Nearshore Vertebrate Predators

Project Number:	95075
Restoration Category:	Research (new)
Proposed By:	NOAA
Cost FY 95:	$197,500
Cost FY 96:	$116,600
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Sea otter, harlequin duck, intertidal organisms

INTRODUCTION

The blue mussel, *Mytilus trossulus*, is a dominant member of intertidal communities in Prince William Sound where mussel populations were injured by the *Exxon Valdez* oil spill (EVOS) to the extent that mussels continue to limit the recovery of a few key predator species. Sea otters (*Enhydra lutris*) feed on mussels and are not considered to have recovered from the EVOS. There are two possible reasons for the continuing impacts: (1) heavy oil contamination of some mussel beds is exerting a direct toxicological effect on sea otters; (2) oil pollution has had an impact on mussel abundance and population structure. Previous studies have confirmed the continuing oil-contamination of some mussel beds, but those studies have not examined mussel population structure, mussel growth or biomass distribution. Food limitation and changes in benthic community structure are important factors influencing the recovery of some injured resources (e.g., sea otters). Because mussels represent a major part of the diet of young sea otters and females with large dependent pups, recovery of sea otters may be constrained by reduced prey abundance or biomass. Mussels provide spatial complexity, interact strongly with other occupiers of space and act as prey for a broad range of invertebrate and vertebrate predators. Changes in mussel abundance often result in major changes in intertidal community structure which could, in turn, affect recovery of sea otters that forage in the intertidal region.

This project will coordinate with the mussel bed restoration study (by occupying some of the same sites and sharing chemistry data where appropriate). This project will measure the abundance, size distribution and growth of mussels in populations at oiled and unoiled locations and relate the measurements to known predator densities.

NEED FOR THE PROJECT

This project is designed to meet the needs of NVP and where appropriate bridge the gap between NVP and the mussel bed restoration project. The project will determine the relative influence of mussel contamination and food limitation on the recovery of injured vertebrate species. This information will benefit those researchers monitoring the recovery of sea otters.

PROJECT DESIGN

This project will address NVP hypothesis H_{01}: Prey populations in areas where vertebrate predator densities were reduced by oil exposure do not differ from areas where predator populations were not reduced.

A. Objectives

1. Determine the distribution and abundance of *Mytilus* along segments of coast in Prince William Sound with and without oiled mussel beds and under different densities of vertebrate predators.

2. Compare the size structure of populations of *Mytilus* in oiled vs unoiled habitats and under low vs high vertebrate predation pressure in Prince William Sound.

3. Compare concentrations of hydrocarbons in tissues of *Mytilus* in oiled and unoiled habitats. (This objective would supplement the chemical analyses of the mussel bed restoration project where needed.)

4. Measure growth of *Mytilus* in oiled and unoiled habitats and under low and high vertebrate predation pressure.

B. Methods

The distribution and abundance of mussels will be determined over lengths of coastline to be determined by the vertebrate predator subgroup. Within a particular segment of coast, mussel abundance will be estimated using stratified random sampling with proportional allocation. Mussel densities will be estimated using 1/16 m^2 quadrats. Each length of shore will be divided into segments of bedrock, unconsolidated coarse substrate and unconsolidated fine substrate. Sample size will depend on mussel density. Mussels in the quadrats will be counted and maximum shell length will be measured. Mussel tissues will be dried and weighed on a

precision balance. Individual mussels from each substrate type in each segment of coast and in each oiled mussel bed will be tagged with calcein to measure growth. Mussels will be tagged and released at intervals of three months. Tagged individuals will be retrieved and growth measured at the end of each three month period.

Mussels will be collected for tissue hydrocarbon analysis immediately adjacent to a subset of the randomly placed quadrats used for density estimates. Three composite samples of mussels will be collected from oiled and unoiled mussel beds along each stretch of coastline. Samples will be placed in coolers with ice immediately after collection and will be frozen within an hour. Appropriate blanks will be collected at each site. Chain of custody procedures will be followed after collection of all hydrocarbon samples.

C. Schedule

The leader of this project will participate in all planning meetings. Mussel sampling will be conducted in May, July and September 1995. Mussels will be tagged for growth in May, July, September and November 1995 and February and April 1996. An annual report will be completed by March 1996 to be incorporated in the annual synthesis report by April 1996. Laboratory and chemical analyses will be completed by August 1996. Data compilation and computer analysis will be completed by October 1996. A final report will be completed by December 1996.

D. Technical Support

The project will require technical support in hydrocarbon chemistry (UV spectrophotometry and gas chromatography/mass spectrometry). The chemistry will be performed at the Auke Bay Laboratory. The cost of the hydrocarbon chemistry is included in the project budget. Vessel charters will be required to support the field sampling.

E. Location

This project will be undertaken at a minimum of four segments of coastline in Prince William Sound (two in an area of low vertebrate predator density and two in an area of high vertebrate predator density). Potential geographical areas of study include (1) northern Knight and Naked Islands (an area of lowest sea otter density), (2) southern Knight Island (an area of low sea otter density), and (3) northwest Montague Island (an area of higher sea otter density). Each coastal segment will include at least one oiled mussel bed. Each substrate type will be sampled in each coastal segment. The exact coastal segments sampled will be selected in consultation with the vertebrate predator subgroup.

PROJECT IMPLEMENTATION

This project will be implemented by the Auke Bay Laboratory under management by the National Biological Survey. The Auke Bay Laboratory is currently participating in the Mussel Bed Restoration and Monitoring Project and therefore information on site selection and existing data on recently studied mussel beds in Prince William Sound should be readily available to the present project. The Auke Bay Laboratory has unique expertise in and extensive experience with mussel beds in Prince William Sound.

COORDINATION OF INTEGRATED RESEARCH EFFORT

It will coordinate closely with two ongoing restoration projects, the Mussel Bed Restoration and Monitoring Project and the Hydrocarbon Data Analysis and Interpretation Project. Sampling by the present project will be closely coordinated with the Mussel Bed Restoration and Monitoring Project occupying the same sites and sharing chemical analyses where appropriate.

FY 95 BUDGET ($K)

Personnel	94.0
Travel	20.0
Contractual	48.0
Commodities	18.0
Equipment	0.0
Subtotal	180.0
Gen. Admin.	17.5
Total	197.5

Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon

Project Number:	95076
Restoration Category:	Research (new)
Proposed By:	National Marine Fisheries Service
Lead Trustee Agency:	NOAA
Cost FY 95:	$179,900
Cost FY 96:	$310,900 (includes $108,000 for data analysis and report writing)
Total Cost:	Unknown
Duration:	6 years
Geographic Area:	Little Port Walter, Baranof Island, Alaska
Injured Resource/Service:	Pink salmon, commercial fishing

INTRODUCTION

The toxicological effects of the *Exxon Valdez* oil spill on pink salmon in Prince William Sound (PWS) remain a high priority research issue. Since 1991, the pink salmon returns to PWS have declined precipitously. Prior NRDA research projects have documented reduced survival of pink salmon embryos exposed to oil during incubation, and have suggested that the damage may be heritable, thus impacting subsequent generations of fish. High straying rates for pink salmon have also been observed in PWS since the oil spill: straying rates of wild pink salmon returning to PWS in 1991 ranged from 8 to 54% in three streams in oiled locations, and from 11 to 51% in three streams in non-oiled locations.

The effect of oil exposure on straying rates of pink salmon is unknown. Increased straying rates may result from disruption of the imprinting process caused by incubation in oiled substrate. Highly conserved characters such as emergence timing are disrupted by incubation in oiled substrate. A confounding factor in the previous NRDA research on straying was that even fish from non-oiled streams were probably exposed to oil during their saltwater migrations. In addition, too few replicates were used to evaluate differences in straying, given the observed variation. Pink salmon in this proposed study will be exposed to oil only during the incubation phase, and then released to migrate to the Gulf of Alaska through the non-oiled waters of southeast Alaska. The effects of exposure on straying rates will be determined from the

returning adults. The study will also provide information that either validates the high straying rates documented for PWS pink salmon in NRDA F/S Study No. 3778778, or that identifies factors unrelated to oiling that could have caused the observed straying.

Whether incubation in oiled substrate can cause genetic damage is also being examined, and this proposed study will examine the potential for further genetic damage to populations resulting from introgression with straying salmon. This proposed study will complement Restoration Study No. 94191 by providing estimates of marine survival for wild pink salmon exposed to different levels of oil in the incubation substrate and by providing gametes for further analysis of the genetic damage hypothesis.

NEED FOR THE PROJECT

Reliable estimates of the straying rate and heritable damage of wild pink salmon are essential for the effective restoration of the damaged pink salmon population in PWS. Since the *Exxon Valdez* oil spill, returns of wild pink salmon to PWS have been poor, the full extent of injury is still unknown, and the exact mechanism of injury is unclear. Stock separation information to help management protection of damaged stocks has been identified as a high priority general restoration technique, but without knowledge of straying rate, stock separation information is of limited value. Little is known about the straying rate of wild pink salmon even without the confounding effect of oil in the environment. If straying rates as high as 50% occur without any influence from oil, then restoration of damaged pink salmon runs can be expected to occur naturally through recolonization from healthy stream systems. However, if the presence of oil increases straying, fisheries managers must be aware that genetic damage hypothesized to occur as a result of incubation in oiled substrate may be passed on to pink salmon in streams originally not oiled by the *Exxon Valdez*. Thus, damage to wild salmon populations may be more widespread and persistent than previously conceived. Documenting a greater degree of damage could allow additional damage claims under the civil settlement.

The degree of straying of wild pink salmon is also an important facet in the current controversy involving the effects of large-scale enhancement on wild pink salmon populations in PWS. If the high straying rates for wild fish observed in NRDA F/S Study No. 3 are representative of normal rates, then genetic structure of the populations in the region should be relatively homogeneous and large-scale mixing of wild stocks and the hatchery stocks derived from them should be of minor concern. If, however, oil exposure or hatchery practices have artificially increased the straying rates, and rates are normally low, then the genetic diversity among and within wild stocks may be in jeopardy from increased straying.

PROJECT DESIGN

This project has been designed with two components. Component A will examine the effect of oil exposure during embryonic development on marine survival, straying, and gamete viability. Comparisons of straying rates in Component A are valid for dosage response and can stand alone as an experiment, but estimation of actual straying rates is confounded by other factors. Component B evaluates the influence of factors such as the incubation environment, stock, and tagging, on straying. Component B greatly strengthens the evaluation of straying by controlling for these other factors, and is extremely cost-effective because of the resources necessary for Component A: Component B represents approximately 10-15% of the annual cost of the project.

A. Objectives

The objectives of Component A are to expose pink salmon to oil during egg incubation in a simulated intertidal environment, release the fry into salt water, and determine the effect on: 1) straying, 2) marine survival, and 3) gamete viability of returning adults. The objectives of Component B are to determine the influences on straying behavior of 1) incubation environment, 2) stock, and 3) coded-wire tagging.

B. Methods

Component A - Pink salmon eggs from two brood years will be incubated in a controlled simulation of oiled intertidal habitat which occurred in Prince William Sound after the *Exxon Valdez* oil spill. Pink salmon gametes will be collected in the fall of 1995 and 1996 from Lover's Cove Creek, Big Port Walter, Baranof Island, southeast Alaska and transported to the nearby NMFS research station at Little Port Walter (LPW). The fertilized eggs will be incubated at LPW under one of four treatments of oiled gravel: control, low oil, medium oil, and high oil. Eggs will be exposed to salt water for 4-hour intervals every 12 hours to simulate an intertidal environment. Dosing levels will be established by analyzing hydrocarbon concentrations in incubator effluent, substrate, and fish tissue with gas chromatograph and mass spectroscopy (GC/MS) at each major developmental stage: eyeing, hatching, and emergence. For each treatment group, survival to eyeing and emergence, and size at emergence and release will be determined. In the spring of 1996 and 1997, a total of 120,000 pink salmon fry (30,000 per treatment) will be coded-wire tagged (CWT, 3 code lots per treatment) each year before being released into salt water at LPW. An analysis of power indicates 80% certainty that differences in straying of 3-5% between treatments will be detected 95% of the time.

Marine survival and straying rates for the different treatment groups will be determined from the tagged adult pink salmon returning to spawn at LPW and the surrounding area in the fall of 1997 and 1998. Weirs will be set up across Sashin Creek (LPW) and Lover's Cove Creek to collect the adult fish. Additionally, tagged pink salmon will be collected from the Port Armstrong hatchery south of LPW and from streams on the eastern shore of Baranof Island within 20 km north and south of LPW.

Gamete viability and offspring survival to emergence will be determined for each treatment group in each brood year. Gametes from surviving adult pink salmon from each treatment group will be collected, crossed and incubated in a clean environment. Because incubation for the second generation will occur in a clean environment, differences in survival, size, or number of defective individuals can be attributed to oiling effects upon the first generation.

Component B - Pink salmon gametes will be collected from Sashin Creek concurrently with the egg-takes from Lovers' Cove Creek. The Sashin Creek pink salmon population is composed predominately of upstream spawners, while the Lovers' Cove Creek stock is composed predominately of intertidal spawners. Gametes from both stocks will be incubated in both the simulated intertidal environment used for Component A, and in freshwater only (to simulate an upstream environment). For each treatment group, 30,000 fry will be marked with CWTs (3 code lots per treatment. This requires an additional 90,000 fry to be tagged beyond Component A, since the control group in Component A doubles as a treatment in this experiment. In addition to these groups, wild fry emigrating from Sashin Creek and Lovers' Cove Creek in 1996 and 1997 will be captured, marked, and released. From each stream, 30,000 fry will be tagged with CWTs (3 code lots) and 30,000 fry will receive a ventral fin clip.

Tagged and fin-clipped adults from Component B releases will be recovered with no additional effort or resources than those necessary for Component A. Straying rates from the release groups in Component B will be compared to determine the effects on straying of: 1)incubation environment (freshwater vs. intertidal); 2)population origin (upstream population vs. intertidal population); 3) coded-wire tagging (ventral fin-clips vs. CWT wild fry); and 4) hatchery treatment (artificially spawned, and incubated fry vs. wild fry).

C. Schedule

Date	Activity
1/95	Initiate procurements, hiring, contracts needed for project
6/95	Reconfigure LPW wetlab for experimental design
7/95	Set up incubators for 1995 brood
8/95	Oil gravel, spawn pink salmon (1995 brood)
9/95-3/96	Incubation, 44 GC/MS samples collected
3/96	Install weirs for collecting 1995 brood wild fry
4/96	Tagging and release of 1995 brood hatchery and wild fry
4/96	Annual Report
6/96	Contract deliverable, 44 GC/MS samples from 1995 brood
7/96	Set up incubators for 1996 brood
8/96	Oil gravel, spawn pink salmon (1996 brood)
9/96-3/97	Incubation, 44 GC/MS samples collected (1996 Brood)
4/97	Tagging and release of 1996 brood hatchery and wild fry
4/97	Annual Report
6/97	Contract deliverable, 44 GC/MS samples from 1995 brood
7/97	Install weirs for collecting returning 1995BY adults
8-9/97	Recovery and spawning of returning adults (95 brood)

	Contract deliverable, Port Armstrong Hatchery
9/97-3/98	Incubation of gametes from returning adults
4/98	Annual report
7/98	Install weirs for collecting returning 1996BY adults
8-9/98	Recovery and spawning of returning adults (96 brood)
	Contract deliverable, Port Armstrong Hatchery
9/98-3/99	Incubation of gametes from returning adults
4/99	Annual report
9/99	Final report

D. Technical Support

A biometrician will ensure that the study design provides a reasonable chance of reaching statistically valid conclusions. A chemist will establish a dosing protocol, determine hydrocarbon concentrations, and evaluate results of hydrocarbon analysis. The US Forest Service will provide use of a cabin at Lover's Cove Creek. Computer services, data archiving, tagging equipment, incubation facilities, vessel support, and a weir at Sashin Creek will be provided by the Auke Bay Laboratory.

E. Location

Gametes will be collected from Lover's Cove Creek and Sashin Creek, Baranof Island, southeast Alaska. Eggs will be incubated, and pink salmon fry will be tagged at the NMFS research station at Little Port Walter (LPW), located near the mouth of Sashin Creek, 10 km from Lover's Cove Creek. Returning adult pink salmon will be recovered from streams on the east coast of Baranof Island within 50 km of LPW.

PROJECT IMPLEMENTATION

The NMFS, Auke Bay Laboratory will implement this project. The NMFS will provide use of the research station at LPW as a base for the proposed fieldwork. This station will provide housing for project personnel, a wet lab for egg incubation, a weir across Sashin Creek for recovery of adult pink salmon, microscopes for the decoding of CWTs, and facilities for the spawning of adult pink salmon. The Auke Bay Laboratory will provide three tagging machines, vessel support, and computer services. The GC/MS samples will be analyzed under contract with the Auke Bay Laboratory. The Port Armstrong Hatchery will be contracted to provide any returning adult pink salmon that have strayed to this facility. Materials and personnel will be transported to and from LPW via the NOAA vessel *R/V John N. Cobb* and air taxi charters.

In addition to all the services mentioned above, the Auke Bay Laboratory has the technical expertise needed to implement this project. The principle investigator and each co-investigator have been involved with the NRDA process since the *Exxon Valdez* first ran aground on Bligh Reef in 1989.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Research by NMFS on effects of oil exposure to pink salmon has been closely coordinated with concurrent research efforts by ADFG and UAF. This project directly complements Restoration Study No. 94191 and will be fully coordinated with its continuation.

FY 95 BUDGET ($K)

Personnel	76.1
Travel	5.8
Contractual	5.8
Commodities	56.4
Equipment	24.0
Subtotal	168.1
Gen. Admin.	11.8
Total	179.9

Coastal Habitat Intertidal Monitoring and Experimental Design Verification

Project Number:	95086A
Restoration Category:	Monitoring (continuation of 94086)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	ADFG
Cost FY 95:	$892,600
Cost FY 96:	$1,373,100
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Prince William Sound (FY 95 and FY 97) Cook Inlet-Kenai Peninsula (FY 96 and FY 98) Kodiak-Alaska Peninsula (FY 96 and FY 98)
Injured Resource/Service:	Intertidal organisms

INTRODUCTION

The Coastal Habitat Injury Assessment Study (CHIA) was designed to measure ecosystem effects of the EVOS and cleanup on the nearshore community. The study encompassed Prince William Sound (PWS), Cook Inlet-Kenai Peninsula (CIK) and Kodiak-Alaska Peninsula (KAP). The study design allowed inductive statistical inferences of damage to the entire universe of oiled habitats through random selection of sites within habitat categories. Results of these studies can be applied to the damage assessment in higher trophic levels.

At the conclusion of the 1991 field season, several species of algae and invertebrates still showed significant damage to their populations. For most of these populations the recovery status is unknown. This study proposes to revisit the original CHIA sites and assess the recovery rate of damaged species. Percent cover, abundance, biomass, and density of key species will be quantified in all habitats. Recovery will have occurred when community composition, population abundance of component species, and ecosystem functions and services in each injured intertidal habitat have returned to levels that are found on matched, unoiled reference sites.

The second component in this proposal is to validate the After Control-Impact Pairs (ACIP) design employed by the CHIA study. Matched sets of non-oiled sites will be selected using procedures established for the CHIA project. These sites will be monitored and the data evaluated using the same procedures used by the CHIA study.

NEED FOR THE PROJECT

Coastal Habitat Monitoring

This proposed project addresses the explicit need articulated in the "Invitation to Submit Restoration Projects for Fiscal Year 1995" to monitor the injured intertidal resources. Intertidal communities were subjected to the most severe impacts of the spill and subsequent cleanup operations. The intertidal zone is not only a very productive and diverse ecosystem, but it serves as an interface between marine and terrestrial organisms. Algae form a major part of the ecosystem structure, providing protective habitat and forage for many fish and invertebrate species In turn, birds and otters prey on these fish and invertebrates. Understanding the effects of the EVOS on the intertidal is critical in learning the extent of injury and the recovery rate of the effected areas.

Intensive sampling and research during three summers (1989-1991) show that the EVOS and subsequent cleanup had serious and long lasting effects on intertidal algae. Results generally showed lower percent cover and biomass of algal species (especially the perennial *Fucus*) on oiled sites compared to reference sites and there was a corresponding increase in the amount of bare rock at the oiled sites. In addition, *Fucus* plants in oiled sites were not as reproductive as those in reference sites and had higher levels of epiphyte infestation. Other algae had varying responses to the oiling, with significant differences detected for some species through 1991. However, each tidal elevation zone, each habitat, and each area had different patterns.

Analyses of intertidal invertebrate abundance and biomass revealed differences between oiled and control sites for several major taxa. These were the grazers *Tectura persona, Littorina sitkana*, and *L. scutulata*, the barnacles *Chthamalus dalli Balanus glandula* and *Semibalanus balanoides* and the mussel *Mytilus*; amphipods, and oligochaetes. Differences varied between regions and habitat types. Recovery of sheltered and exposed rocky invertebrate communities was proceeding in some areas based on comparisons of significant differences between oiled and unoiled sites. Coarse textured and estuarine invertebrate communities had not fully recovered as of the last observation in 1991.

The intertidal fish populations, which are important forage species for the river otter and some avian species, were altered in oiled sites in 1990, followed by some recovery in 1991 within PWS sites. Density and biomass of intertidal fishes were less at reference sites in all three habitat types; exposed rocky, sheltered rocky, and coarse textured, during 1990. In 1991 some recovery occurred in sheltered and exposed rocky habitats but not at coarse textured sites. In sheltered and exposed rocky habitats, oiled and reference sites density and biomass increased between 1990 and 1991, but the increases were much greater at oiled sites than at reference sites.

Because the intertidal ecosystems still showed damage in 1991, the recovery status of the intertidal is not known. This project will monitor the status of the intertidal at previously visited sites. All sites will be revisited twice over a four year period to determine if population structures of damaged species have returned to pre-spill levels and have stabilized.

Experimental Design Verification

The experimental design used in the Coastal Habitat Injury Assessment program has potential flaws, in that there may be intrinsic differences between the oiled and reference sites, even without oiling and/or cleanup. This problem has been recognized in the "Invitation to Submit Restoration Proposals". Accordingly, we have devised a scheme to verify the experimental design by monitoring matched, non-oiled sites.

The optimal design for environmental impact monitoring includes sampling both before and after a disturbance event, at pairs of impacted and reference sites. This process is a BACIP (Before-After, Control-Impact Pairs) design. Very few of the current studies of the effects of the EVOS have been able to use this design due to the of the lack of pre-spill data. Instead, we have relied on sampling at pairs of oiled and reference sites after the spill to infer injury to biological resources in coastal habitats. This process is the ACIP (After Control-Impact Pairs) Design. Correct interpretation of the results produced from this design are based on the assumption that oiled and reference sites would not have differed if there an oil spill had not occurred.

There are resources within both the subtidal and intertidal habitats that have shown consistent differences among oiled and control sites using the ACIP design. For example, percent cover by *Fucus* in the mid intertidal in Prince William Sound has been consistently higher at reference than at oiled sites, and *Musculus* density on eelgrass in Prince William Sound has been consistently higher at oiled sites. Without pre-spill data, it is difficult to establish whether these differences represent long term impacts of the spill, or whether they represent inherent differences among sites. It may be that the predominant wind and current conditions within Prince William Sound that were responsible for bringing oil to specific beaches were also responsible for bringing higher concentrations of *Musculus* larvae to those same beaches.

There are essentially two ways to address this issue. First, long term monitoring of resources could be conducted to determine if the resources at oiled and reference sites "converge" after some period. This approach suffers from that fact that convergence may take very long to occur, or may never occur if some alternate stable state has been achieved after the spill. In the shorter term, agencies are faced with making decisions regarding possible restoration of supposedly injured resources. A second approach is to conduct an independent test of our ability to match oiled and control sites, and to demonstrate that the site selection process produced no biases that may have resulted in inherent differences among oiled and control pairs.

Verifying the process by which matched pairs are selected also has much larger implications with respect to monitoring programs that may be used to evaluate impacts of future oil spills as well as other disturbances. The uncertain time and location of oil spill beach impact makes it extremely difficult to obtain the appropriate "pre-spill" data at both impacted and reference sites. Costly "baseline" monitoring programs often result in data that are largely unusable for evaluating injuries. Evaluation of injuries from spills usually relies on sampling conducted only after the spill. The establishment of *a priori* criteria for the selection of oiled and control sites, and the *a priori* verification that this selection process does not produce biases in oiled-control comparisons, would be very useful in supporting inferences made from future post-spill surveys. In addition, establishment and verification of *a priori* site selection criteria, could prove much more useful, and much more cost effective than baseline monitoring studies.

PROJECT DESIGN

A. Objectives

General Objectives

1. To determine whether intertidal habitats still show damage, by conducting a comprehensive monitoring program of intertidal communities in the areas impacted by the EVOS, using the matched paired sites monitored during the CHIA study.

2. To determine if previously used site selection criteria may have resulted in biases that could lead to inherent differences among oiled and control sites that were unrelated to oiling.

3. To establish criteria for the unbiased selection of oiled and control site pairs to be used in assessing injury from future oil spills or other disturbances.

Specific Objectives

1. To monitor the original PWS CHIA study sites in sheltered rocky, exposed rocky, coarse textured, and estuarine habitats. Collect data on algal percent cover, densities of damaged invertebrate species, and densities of intertidal fish. Specific questions that will be addressed include:

   a. Have algal, invertebrate, and fish species that showed damage in PWS in 1991 recovered? If not, to what degree has recovery occurred?

b. What habitat variables seem to affect PWS populations of algae, invertebrates, and intertidal fish?

c. Was the increase in density and biomass of intertidal fish at PWS oiled sheltered and exposed rocky habitats due to recovery or interannual variability?

2. To select new sites within the sheltered rocky and coarse textured habitats in PWS for testing the ACIP stratified random sampling design. Sites will be selected with the same protocol used to select the final CHIA sites.

3. To monitor the new sites from the sheltered rocky and coarse textured habitats with the same methods used in the original sites.

B. Methods

CHIA Site Monitoring

The original matched pairs in the PWS region on sheltered rocky, exposed rocky, coarse textured, and estuarine habitats will be sampled, for a total of 28 sites. The sampling efforts for this monitoring study will focus on non-destructive measurements of intertidal algae percent covers and abundances of grazers, primary space competitors, and invertebrates and fish predators. In addition, on coarse textured and estuarine sites, some infaunal sampling will occur as those organisms showed clear statistical differences through 1991. Quadrats are located along each of six vertical transects at the first, second, and third meters of vertical drop (MVDs) from the mean high water (MHW) line. For some measurements, additional transects will be laid out, i.e. for line transects as described below.

1. Methods for Algal Sampling

Percent cover of benthic algae will be determined on all undisturbed quadrats using the point-contact method developed by the CHIA studies. In addition, we will perform estimations of percent cover of understory ("turf") algae and characterize the substrate at each quadrat. Specific measurements will be made on randomly selected *Fucus* plants in each MVD at each site. Measurements on *Fucus* will include plant density, size frequency distribution, degree and type of epiphytism, and reproductivity.

2. Methods for Invertebrate Sampling

Direct counts will be made of epifaunal organisms within original undisturbed quadrats. Within a semi-circle placed directly to the side of the quadrat, size measurements will be made for the nearest limpets. Double sampling will be used to calibrate the enumeration method for counting larger epifauna in quadrats to the method of removing all organisms from within the quadrat and counting organisms in the laboratory.

At coarse textured and estuarine habitats, in addition to counting epifauna, infauna will be collected and preserved. Sorting will be limited to those taxa which are dominant and/or showed impact during the CHIA study (i.e. oligochaeta, amphipoda, and polychaeta). Counts and wet weight will be determined for each taxon.

Larger invertebrates such as sea stars, whelks, and anemones, which are important predator members of the intertidal community but are mobile and unevenly distributed, will be surveyed using 2-m wide strip transects from MHW to the water line. Additional surveys will be done by divers during high tides in order to get a better count of cryptic organisms that tend to seek refuge when emerged during low tides.

Coverage and extent of mussel beds or zones on oiled and reference sites will be estimated using a line intercept method. A series of transects perpendicular to the water mark will be traversed from MHW to the water line. The length of the intersection with mussel beds or dense mussel zones, as well as measurements of the size of each mussel zone or bed will be made. Subsamples from within each mussel zone or bed will be collected for size-frequency analyses.

3. Intertidal Fish Methods

Fish sampling methods will be similar to those employed during the CHIA studies. A one meter wide strip transect beginning at 1 MVD and orientated perpendicular to the MHW line will be sampled for intertidal fish. Percent cover by algae and substrate types will be measured using a point contact method. Fish species collected within the strip transect will be preserved, measured, and weighed. Abundance and biomass of fish per unit area will be computed from fish captured within each MVD. Resource selection techniques will be used to determine what habitats are preferred by intertidal fish.

In coordination with the line intercept invertebrate collections, percent cover of mussels, algal morphotypes, and substrate types will be estimated using a point contact method in a 1-m by 1-m quadrat frame. These data will aid in characterizing each site by substrate, algae, and invertebrates, and allow determinations of habitat preference by intertidal fish.

Experimental Design Verification

One way of assessing our ability to select matched pairs of oiled and reference sites would be to use existing reference sites, select a new set of reference sites that matched the old reference sites (using criteria that are the same as those used in previous oiled-reference comparisons), sample at the old and new matched reference sites, and determine if there are significant differences among these. This process ignores possible biases related to oiling. It may be, for example, that wind and currents that bring oil to a site make the universe of potential oiled sites different from the universe of potential reference sites.

A second approach is to rely on an oil spill simulation model to define a potential universe of "simulated oiled" sites, select a set of "simulated oiled" sites from this universe, select matched reference sites, sample at "simulated oiled" and matched reference sites, and test for significant differences among sites. This approach also has potential drawbacks. Existing simulation models are very coarse grained and outputs from these models would likely result in large sections of coastline being simulated as oiled. This is in contrast to actual oiling observations which indicated that very often, heavily oiled and unoiled beaches were in close proximity to one another. Because of the coarse grained nature of the simulation models, "simulated oiled"

and reference sites may be separated by large distances. As a result, using "simulated" oiled and reference comparisons could result in a very conservative test of our ability to select matched pairs.

As a result of the imperfect nature of both designs, we propose to use a combination of approaches. First we will use an oil spill simulation mode to predict what portions of the Sound will be oiled in a simulated spill. We will overlay the shoreline types onto the simulated oiling map using existing GIS (Geographic Information System) databases, and select "simulated oiled" sites. Matched reference sites will be selected using the same criteria used to select reference sites after the spill. In addition, a second set of reference sites will be matched to those reference sties so that we can make reference-reference comparisons. The distance between these reference pairs will be no closer than the minimum distance between oiled and reference sites in the original injury assessment studies.

These studies will be conducted only within Prince William Sound and only within two selected habitat types (sheltered rocky and coarse textured beaches). Sites from both habitats will be selected in 1995, but only the sheltered rocky habitat will be sampled in that year. Coarse textured beaches will be sampled two years later in 1997. A total of 5 "triplets" of sites (a simulated oiled site, its matched control, and a second control matched to the first) will be sampled in both sheltered rocky habitat and coarse textured beaches. The community attributes that will be measured and the sampling methods will be similar to that described for the monitoring program.

C. Schedule

Oct-Dec 94 GIS selection of additional sites for experimental design verification
Jan-Apr 95 Obtain helicopter charter/boat charters and visit sites selected by GIS
May-Jun 95 Sample on CHIA sites in PWS
Jun-Jul 95 Sample on additional sheltered rocky sites in PWS
Jul-Sep 95 Sample analyses in laboratory
Sep-Dec 95 Data analysis/report writing
Apr 96 Submit annual report for FY 95

The site selection for the verification for the intertidal reference sites will be conducted during early May 1995. We plan to select reference sites for both the sheltered rocky and coarse textured sites at this time. The sampling of these reference sites will be conducted for the sheltered rocky habitats in late June 1995 and for the coarse textured habitats in June 1997. The results of the site selection for the sheltered rocky habitats will have to be available to the team doing the intertidal monitoring by early June 1995.

May-Jun 96 Sample on CHIA sites in CIK and KAP
Jun-Sep 96 Sample analyses in laboratory
Sep-Dec 96 Data analysis/report writing
Apr 97 Submit annual report for FY 96
May-Jun 97 Resample CHIA sites in PWS
Jun-Jul 97 Sample on additional coarse textured sites in PWS
Jul- Sep 97 Sample analyses in laboratory
Sep-Dec 97 Data analysis/report writing
Apr 98 Submit annual report for FY 97
May-Jun 98 Resample CHIA sites in CIK and KAP
Jul-Sep 98 Sample analyses in laboratory
Sep-Dec 98 Data analysis
Jan -Jun 99 Report writing
July 99 Submit final report for project

D. Technical Support

Principal investigators from the University of Alaska School of Fisheries and Ocean Sciences, will cooperate to provide expertise on different aspects of the intertidal study: algal, invertebrate and fish taxonomy and ecology. All mobilization and demobilization efforts associated with the charter vessel will be accomplished through the Seward Marine Center in Seward, Alaska. A project manager will oversee project logistics and personnel.

All sample and data analysis will take place at the School of Fisheries and Ocean Sciences, University of Alaska Fairbanks, the Juneau Center for Fisheries and Ocean Sciences and at Coastal Resources Associates, using available computers and established data management services. A contract will be issued for the use of research vessels able to support the field work in Prince William Sound. A similar contract will be established for air taxi support between Anchorage and Prince William Sound.

A contract will be issued to Coastal Resources Associates (CRA) of Vista, California and to Western EcoSystems Technology, Inc. (WEST) for the experimental design verification aspect and to assist with the monitoring program. CRA and WEST have been involved with the CHIA study since 1989, and have played an integral part in the experimental design and data analysis procedures. In order to maintain consistency with the data collection, experiment modifications, analyses and report writing, it will be necessary to continue the existing contracts established with CRA and WEST.

The GIS databases developed by the Department of Natural Resources will be an integral part of this program. We will require their assistance in integrating the NOAA oil spill model into the GIS database and in developing the GIS model to select the reference sites.

E. Location

FY 95 and FY 97: This study will take place in the intertidal zone on Prince William Sound sheltered rocky, exposed rocky, coarse textured, and estuarine sites.

FY 96 and FY 98: This study will take place in the intertidal zone on Cook Inlet-Kenai Peninsula sheltered rocky, coarse textured and estuarine sites and on Kodiak-Alaska Peninsula sheltered rocky and coarse textured sites.

PROJECT IMPLEMENTATION

The original CHIA project was implemented by the Alaska Department of Fish and Game (Phase I) and the U.S. Forest Service with a contract to the University of Alaska (Phase II). At this time the project should be implemented by the University of Alaska through the Habitat and Restoration Division of the Alaska Department of Fish and Game. The University has the historical records of the sites and all of the raw and processed data from 1989 to 1991. The University is in the best position to assure the consistency of the data to allow for comparisons to the previously collected data. The Alaska Department of Fish and Game is also currently involved in the monitoring and restoration of the nearshore through existing contracts with the University for work in the subtidal (S. Jewett) and at Herring Bay (R. Highsmtih and M. Stekoll).

In addition, both CRA and WEST were key players in the original site selection and ACIP experimental design. Verification of the experimental design will be difficult to perform without input from these two entities and the University of Alaska.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This multi-disciplinary study will be conducted by a team of scientists with first hand experience in the monitoring of the effects of oil in Prince William Sound. This team of the investigators has been working together over the past five years in evaluating the effects of the *Exxon Valdez* oil spill on intertidal and subtidal communities. Principal investigators from the University of Alaska Fairbanks and University of Alaska Southeast will be coordinating efforts to study interactions between key algae, invertebrate and fish. Coastal Resources Associates, Inc. will be consulted for the selection process for the additional sites needed for verification of the matched pair design. Western EcoSystems Technology, Inc., will be consulted for the site selection procedures, for sampling protocols that will enable comparisons from the destructive sampling efforts used in 1989-1991 to the non-destructive sampling efforts to be used for this study, and for statistical analyses of all data.

FY 95 BUDGET ($K)

Personnel	9.0
Travel	0.0
Contractual	852.7
Commodities	0.0
Equipment	0.0
Subtotal	861.7
Gen. Admin.	30.9
Total	892.6

Herring Bay Monitoring and Restoration Studies

Project Number:	95086C
Restoration Category:	Research (continued)
Proposed By:	University of Alaska
Lead Trustee Agency:	ADFG
Cost FY 95:	$904,200 (includes $327,300 for data analysis and report writing on FY 94 work)
Cost FY 96:	$789,800
Total Cost:	Unknown
Duration:	6 years
Geographic Area:	Herring Bay, Knight Island, Prince William Sound
Injured Resource/Service:	Intertidal organisms

INTRODUCTION

Following the *Exxon Valdez* oil spill (EVOS) and subsequent clean-up activities, research was conducted under the Coastal Habitat Injury Assessment (CHIA) program within the shallow subtidal and intertidal zones in the oil-affected habitats in Prince William Sound (PWS), and in the intertidal zones in Cook Inlet - Kenai Peninsula (CIK), and Kodiak - Alaska Peninsula (KAP). In addition, the Herring Bay Experimental and Monitoring Studies were conducted within Herring Bay, Knight Island, in Prince William Sound. All of these projects found damage to both the shallow subtidal and intertidal invertebrate and algal communities. Significant differences were detected between oiled and reference sites for grazing invertebrates such as *Tectura persona, Lottia pelta, Littorina sitkana,* and *L. scutulata* and for the primary space competitors *Fucus, Mytilus,* and several species of barnacles. Most of the invertebrates showing damage are prey for either other invertebrates or for foraging birds or marine mammals. Further research will allow better interpretations of key relationships in the damaged nearshore ecosystem.

Several ongoing monitoring and experimental studies have continued in Herring Bay since 1990 and are continuing through the 1994 field season. In addition to these studies, several new experiments are proposed to identify important community interactions between and among invertebrates and algae for determining factors that limit or control recovery. More specifically, the proposed studies are designed to answer one or more of the following ecosystem process questions:

1. Do dominant competitors and resident predators limit recovery of the damaged intertidal community? Included within this question are whether the presence of certain grazers limits the recovery of algal species.

2. Are predators limited by reduced populations of prey species? Included in this question are the affects of reduced algal cover as a food source to grazers.

3. Is the recovery of the community structure limited by recruitment processes?

4. Do physical processes limit recovery of damaged intertidal species, including the effects of damaged species that act as structure and protection for other species?

A combination of new and continued experiments in Herring Bay is proposed to elucidate the ecosystem processes that control community structure and recovery.

NEED FOR THE PROJECT

Five years after the EVOS, several intertidal species are still showing damage, including *Fucus*, the important structural component of the intertidal ecosystem. Continued monitoring of several key invertebrate and algal species in Herring Bay will allow estimates of the degree and rates of recovery of damaged species. This project will aid in defining the rates and potentials for recovery of damaged intertidal resources by ascertaining the major limitations to settlement, recruitment, and growth of *Fucus* and of invertebrates such as barnacles, mussels, and limpets.

A restoration aspect of the experimental study is focusing on the restoration of the damaged *Fucus* populations in the upper intertidal. This experiment is testing the feasibility of using a biodegradable substrate seeded with *Fucus* embryos to recolonize the high intertidal habitat by reducing heat and desiccation stress.

PROJECT DESIGN

A. Objectives

The objectives of this study are to identify the key relationships between damaged intertidal invertebrates and algae, to monitor the rates and degree of recovery of damaged intertidal resources, and to measure the natural rates and the feasibility of *Fucus* restoration in the upper intertidal.

These objectives will be accomplished by focusing each experiment to answer one or more of the following questions:

1. Are some species limited by predation and/or competition?

2. What limits food availability for grazers (i.e. limpets, littorines) and predators (i.e. *Nucella)*?

3. Is recovery limited by recruitment and, if so, what are the limiting factors?

4. How do physical factors, such as reduced protective cover or water circulation, limit species recovery?

We have keyed each experiment listed below to these question numbers.

B. Methods

Monitoring (Ongoing)

Population dynamics (1).
Population dynamics of *Fucus*, sessile invertebrates, and grazers will continue to be quantified in established quadrats at six pairs of oiled and reference sheltered rocky and coarse textured sites. Organisms will be counted within six quadrats that have been permanently established within each of the first three meters of vertical drop (MVD) below mean high water. The quadrats will be visited twice during the summer. The number of *Fucus* plants in various size classes will be determined. Reproductive status and condition of the plants will also be recorded. Limpets, *Nucella spp.*, and *Littorina sitkana* will be counted, and subsamples of each will be measured.

Fucus egg settlement (3)
Fucus egg settlement on oiled and control sites will continue to be monitored because of its importance to *Fucus* recovery. Grooved plates designed to catch *Fucus* eggs will be placed at three tidal levels (0.5, 1.0, and 2.0 MVDs) along four transects at each of four pairs of sites. The number of eggs settled on plates after 24 hours will be recorded. The experiment will be repeated three consecutive days at each site.

Experimental (Ongoing)

Fucus/limpets/other algae interactions (1,3,4)
Evidence indicates that ephemeral algae colonized better in areas devoid of *Fucus*, while in areas where the *Fucus* beds remained relatively intact, ephemeral algae were less abundant. *Fucus* may release allelochemicals which assist in both interplant competition for space and resources and grazer deterrence. To investigate this we will continue to monitor cleared plots with various sized buffer zones that were established in 1993. Each replicate consists of four plots at 2 MVD, one for each buffer zone treatment plus an unmanipulated control. Circular

buffer zones of 50 cm, 1 m, and 2 m radii were cleared around monitored plots. The sampling area consists of a cleared 25 cm radius circle. Percent cover, understory cover, and primary space occupancy will be measured. In addition, the effects of reduced *Fucus* cover on limpet densities will be determined. Limpet densities will be followed over time and comparisons made between plots of differing size and between treatment plots and controls.

Nucella/mussel interactions (1,2)
The size-frequency distributions of mussels will continue to be studied within the mussel band on three matched pairs of sites. Two major predators on mussels are the whelks *Nucella lima* and *N. lamellosa*. Both of these species will be censused on each site in an attempt to relate *Nucella* densities to the size-frequency distribution and densities of mussels on each site. *Nucella* exclusion and inclusion cages will be maintained over randomly selected plots within the mussel zone on each of the sites to estimate their rates of predation on mussels and their influence on the size-frequency distributions of mussel populations.

Barnacle species interactions (1,3)
Data collected during the Coastal Habitat Intertidal Assessment project showed significantly higher densities of *Chthamalus dalli* on oiled sites compared to control sites within the first three MVDs. In undisturbed systems, *Chthamalus* species tend to be restricted to the highest zones in the intertidal, as they are excluded by the superior space competitors, *Balanus glandula* and *Semibalanus balanoides*, in the lower intertidal. *Chthamalus dalli* appears to be the barnacle species that initially benefited from the free space created by the oil spill and clean-up activities. We will continue to monitor recruitment and post-settlement survival ratios of *C. dalli* compared to *S. balanoides* and *B. glandula*. The three sites used in this study are all on oiled vertical rock faces.

Effects of herbivores on *Fucus* recruitment, growth, and survival (1,3)
The effects of herbivores on *Fucus* recruitment, survival, and growth will be investigated. Heterogeneous polycarbonate plates manipulated by three treatments of full cage, open cage, and no cage will be set out at three tidal levels (1, 2, and 3 MVDs). The number of germlings and size of the five largest germlings on each plate will be recorded. The experimental design will be repeated at six sites.

Mussel recruitment/filamentous algae interactions (3,4)
Mussel larvae tend to settle temporarily on filamentous algae in the mid and low-intertidal zones. On sites used for *Nucella*/mussel interaction studies, filamentous algal percent cover will be determined within each MVD. Filamentous algae samples will also be collected at each MVD three times per field season to determine the number of young mussels that have settled onto the algae. The data will be related to the size-frequency distribution data collected in the *Nucella*/mussel interaction study.

Substrate use by *Fucus* (3,4)
Substrates used by large and small *Fucus* will be examined in relation to substrate availability. The proportion of plants from three different size classes (<2 cm, 2-10 cm, and >10 cm) using cracks, barnacles, rock surface, and other substrates will be compared to relative availability of the different substrates.

Effects of physical environment on *Fucus* recruitment (3,4)
The effects of physical environment on *Fucus* recruitment will continue to be studied. *Fucus* recruitment will be monitored on tiles with various sized grooves placed under a variety of conditions including in and out of *Fucus* canopy, at different tidal levels, and at oiled and control sites.

Effects of water movement on mussel and *Fucus* growth rates (4)
To test whether mussel growth rates on oiled sites within Herring Bay are different from those on control sites, tagged and measured mussels have been caged in the intertidal and periodic measurements will be made to determine growth rates. Any differences detected may be due to differences in relative water motion on oiled versus control sites. To test this idea, calcium sulphate dissolution rates will be determined on all sites where mussel growth rates are being measured.

Study of water movement effects on *Fucus* growth with and without *Fucus* canopy will continue. Two similar plants will be marked at 18 sites varying in exposure to waves. All plants able to touch one of the marked plants will be removed, and the canopy around the other marked plant will be left intact. Average water velocity will be measured at each site by deploying calcium sulfate dissolution sticks.

Experimental (New)

Fucus/barnacle/mussel interactions (1)
This study is designed to elucidate the positive or negative interactions among *Fucus*, mussel, and barnacle populations. Treatments will include replicated reciprocal removal of *Fucus* and barnacles in a mixed *Fucus*/barnacle zone; reciprocal removal of *Fucus* and mussels in a mixed *Fucus*/mussel zone; reciprocal removal of each species in a mixed *Fucus*/mussel/barnacle zone; and control treatments where no removal occurs. Recruitment and existing densities of each species will be monitored over time.

Oystercatcher/limpet/mussel interactions (1)
Because of the importance of integrating study of the intertidal system with that of external interacting systems, the effects of oystercatcher predation on intertidal community structure will be investigated. Oystercatchers will be excluded from foraging areas of the intertidal using cage domes. Plots within and outside of exclosures will be monitored for changes in intertidal community structure.

Effects of epiphytes on *Fucus* reproduction (1)
The effects of epiphytes on *Fucus* reproduction will be examined. Using existing population dynamics data, comparisons between percent cover of different types of epiphytes and both the number of reproductive plants and the mean number of receptacles per reproductive plant will be made.

Fucus as habitat for invertebrates (2,4)
The importance of *Fucus* as a structural habitat for intertidal invertebrates will be investigated. Similar plants located at 3 MVDs will be randomly chosen to be clipped and bagged while submerged under high tide or while exposed during low tide. Invertebrates trapped by the bags will be enumerated by taxa.

Effects of mobile predators (1,2)
Seastars are unevenly distributed in Herring Bay on coarse textured and sheltered rocky shorelines. We will census the numbers of these mobile predators on the five matched pairs of population dynamics sites and on the mussel study sites. These predator densities will be related to potential prey densities on the same sites.

Nucella are intense predators in the mussel zone and their densities will be determined in the mussel zone on selected sites as described under *Nucella*/Mussel Interactions. Many *Nucella* have been removed from the intertidal as prey for birds. Avian exclusion/*Nucella* inclusion cages will be placed in the intertidal on selected sites next to *Nucella* inclusion cages that allow access to bird predators. Comparisons between these two treatments will be made for determinations of avian predation pressure on *Nucella* populations around Herring Bay.

Effects of ice scouring (4)
Several areas within Herring Bay, especially on the eastern side of the bay, where most of the control sites are located, have shown severe destruction between a September field visit and a visit the following May. The loss of *Fucus*, mussels, and barnacles occurs in wide bands along the shoreline. The evidence (crushed mussel shells and barnacle tests and *Fucus* holdfasts ripped out) indicate that this destruction may have resulted from ice scouring over the winter. The extent of ice scouring within the intertidal will be addressed by placing painted and/or pencil rebar covered cement blocks in the intertidal in locations where ice scouring is suspected to have decimated populations in the past and in areas where no ice scouring has been observed. The condition of the paint and rebar will be assessed the following spring (1996).

Effects of desiccation on *Fucus* egg release (4)
Observations suggest that desiccation/temperature might have a negative impact on *Fucus* egg release. These effects will be tested by comparing the number of eggs released by plants under direct sunlight compared to artificially shaded plants. Twenty *Fucus* plants will be placed on a hard surface in the sun with ten randomly chosen to receive shading and watering. Desiccation rates and temperature will be recorded near each plant. After one, two, and three days of exposure, randomly chosen receptacles from each plant will be rehydrated for 24 hours and the number of released eggs will be assessed.

Structural importance of *Fucus* (4)
Observations suggest that the physical structure that *Fucus* provides to the intertidal environment might be more important than other resource attributes. To test this idea, artificial *Fucus* plants will be mounted above polycarbonate plates with heterogeneities. Differences in recruitment, growth, and survival of intertidal invertebrates on the plates and the plants with artificial *Fucus* canopy, no canopy, and *Fucus* canopy will be assessed.

Restoration (Ongoing)

High intertidal *Fucus* restoration (3,4)
Restoration of severely damaged intertidal algal populations has been started on a small scale basis at a heavily oiled rocky intertidal site in Herring Bay, Prince William Sound. A series of high intertidal plots were started in 1992 to test various techniques for increasing *Fucus* recruitment. These techniques included the attachment of erosion control fabrics to the rock substrate to produce a more favorable microclimate for small *Fucus* plants. Surveys made in May 1994 showed that there were dense populations of small *Fucus* plants on the coconut fiber fabric deployed in 1993, especially in the lower portions and where we had transplanted fertile plants. We will continue to monitor these plants to quantify their reproduction and their contribution to new recruitment on the substrate around the fabric strips. We will also test other methods for seeding the fabric with embryos to get higher densities of plants.

We have identified other areas of Prince William Sound where *Fucus* may not be recovering by using the Oil Spill Geographical Information System (GIS) databases assembled by the Alaska Department of Natural Resources (DNR). We have conservatively estimated that there are 12 miles of coastline throughout Prince William Sound that fit the physical criteria of the unrecovered beaches we have seen in Herring Bay. The results of surveys of some of these sites in May 1994 showed that the upper limit of *Fucus* at the oiled sites is approximately a half meter lower than populations at control sites. We will continue to survey a random selection of beach segments identified by the DNR GIS as being in the potentially unrecovered category. Surveys will quantify *Fucus* density in the 1 and 2 MVD tidal levels, as well as the upper limits of the *Fucus* on the transects.

C. Schedule

(Information not provided.)

D. Technical Support

Principal investigators from the University of Alaska School of Fisheries and Ocean Sciences, will cooperate to provide expertise on different aspects of the intertidal study: invertebrate and algal taxonomy and ecology. All mobilization/demobilization efforts associated with the charter vessel will be accomplished through the Seward Marine Center in Seward, Alaska. A project manager will oversee all logistical and personnel aspects of the project.

All sample and data analysis will take place at the School of Fisheries and Ocean Sciences, University of Alaska Fairbanks and the Juneau Center for Fisheries and Ocean Sciences, using available computers and established data management services.

A contract will be issued for the use of a research vessel able to support the field work in Herring Bay. This vessel must be able to meet all University safety requirements and be of sufficient size and configuration to meet the needs of the science specified above. Bid specifications will be drawn up and request for proposals will be sent out to prospective bidders. A similar contract will be established for air taxi support between Anchorage and Herring Bay. A contract will also be issued to Coastal Resources Associates (CRA) of Vista, California. CRA has been involved with the Herring Bay study from its inception in 1990. In order to maintain consistency with the data collection, experiment modifications, analyses and report writing, it will be necessary to continue the existing contract established with CRA.

We will need updates of the GIS model from the Alaska Department of Natural Resources to include various parameters for shoreline aspect and possibly oiling classification.

E. Location

The proposed restoration, monitoring, and experimental studies will be conducted in the Herring Bay, Knight Island area. Intertidal studies were initiated in Herring Bay in May 1990 and are continuing through the 1994 field season. Herring Bay was heavily oiled in 1989, and was a central area for clean-up efforts. The bay was chosen for experimental studies because of its oiling history and close proximity to non-oiled sites used as controls.

PROJECT IMPLEMENTATION

The Alaska Department of Fish and Game has implemented the Herring Bay Experimental and Monitoring Study for the last two years. Due to the successful coordination of the University of Alaska with this agency, a continuation of this partnership should continue for future funding.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Principal investigators from the University of Alaska Fairbanks and University of Alaska, Southeast will be coordinating efforts to study interactions between key invertebrate and algal species. In addition, Dr. Stekoll will be cooperating with Dr. Deysher from Coastal Resources Associates for field sampling for the Restoration of High Intertidal *Fucus* study. Dr. Brad Andres of the U.S. Fish and Wildlife Service will be cooperating with the oystercatcher experiments.

The studies at Herring Bay are closely integrated with the Shallow Subtidal Studies and the Coastal Habitat Monitoring Studies. In addition this study will provide valuable information for use by studies of higher trophic level organisms such as those on shore birds, ducks and otters, that utilize the intertidal and shallow subtidal ecosystems.

FY95 BUDGET ($K)

Personnel	9.0
Travel	0.0
Contractual	864.0
Commodities	0.0
Equipment	0.0
Subtotal	873.0
Gen. Admin.	31.2
Total	904.2

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Relation of Sea Urchin Population Structure to Recovery of Injured Nearshore Vertebrate Predators

Project Number:	95087
Restoration Category:	Research (new)
Proposed By:	University of Alaska Fairbanks and Coastal Resources Associates, Inc.
Lead Trustee Agency:	ADFG
Cost FY 95:	$48,800
Cost FY 96:	$78,300
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Sea otter, intertidal organisms

INTRODUCTION

Sea urchins, a favored food of otters, consume large amounts of algae (especially kelps) and can have profound effects on the structure of nearshore ecosystems. Prior to the spill there were few urchins in Prince William Sound, presumably because of predation by otters. It was predicted that a decrease in otter populations, as a result of the *Exxon Valdez* oil spill, may lead to increases in urchin densities and subsequent decreases in kelps. Observations in 1990, 1991 and 1993 suggest that, in fact, urchin populations are increasing within the Sound. We noted higher than usual urchin densities in 1993 under cobbles in the lower intertidal, and occasional large patches of small urchins in subtidal eelgrass beds. Monitoring of epibenthic invertebrates within the Sound has been carried out previously (Subtidal Studies, University of Alaska), but there have been no previous efforts to specifically examine sea urchin populations.

This project will examine changes in the distribution and abundance of sea urchins in Prince William Sound, and will examine the availability of sea urchins as food for injured sea otter resources. Questions that will be addressed regarding sea urchin populations are:

1. Are urchin population densities increasing in the Sound?
2. If so, is this increase related to the a lack of predation by otters?
3. Is the increasing urchin population a potential food source for recovering otter populations?

NEED FOR THE PROJECT

One hypothesis for a lack of recovery of sea otters is that food availability is limiting. Sea urchins provide an important potential food source for otters. An increase in urchin populations may provide food for otters that may offset otherwise impoverished food supplies.

In addition, increases in sea urchin densities may lead to drastic changes within the benthic community. Sea urchins can have profound effects on nearshore communities, including a reduction in kelps which provide substrate for herring spawn. We need to monitor these potential changes.

PROJECT DESIGN

A. Objective

Document changes in the population density of sea urchins and their availability as food for sea otters.

B. Methods

Examine sea urchins at shallow (< 20 m) subtidal sites where sea otter densities currently range from absent to high. Population density, size structure, recruitment, and growth of urchins will be determined at all sites. Define urchin habitat. Then select sites (at random) from the universe of sites within each category that has appropriate urchin habitat. At each site, determine the size frequency and density of urchins. Examine growth of urchins at representative sites by marking urchins with a calcein dye, releasing them, and collecting urchins at a later time and examining growth rings.

C. Schedule

The field work for this project will begin in June 1995 and be completed in September 1995. Laboratory analysis of urchin growth will be completed February 1996. Data analysis and draft report preparation will be completed in May 1996. Deliverables will consist of a FY 95 progress report to be submitted in September 1995, and a final report to be completed by May 1996. Field work and reporting will follow a similar schedule for subsequent years.

D. Technical Support

Outside technical support will be required for the analysis of growth ring data.

E. Location

The project will be undertaken in western Prince William Sound.

PROJECT IMPLEMENTATION

The principal investigators have been conducting damage assessment/monitoring studies in the shallow subtidal regions of Prince William Sound since 1989. Since these studies have mainly been implemented through Alaska Department of Fish & Game (ADFG), and since this project will overlap with the ongoing work in the subtidal eelgrass habitat, it is appropriate for this project to also be implemented through ADFG.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This study is a component of the nearshore ecosystem project. Information on the food and feeding habits of sea otters will be critical in evaluating the interactions between otters and urchins.

FY 95 BUDGET ($K)

Personnel	6.0
Travel	0.0
Contractual	39.2
Commodities	0.0
Equipment	0.0
Subtotal	45.2
Gen. Admin.	3.6
Total	48.8

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Information Management System

Project Number:	95089
Restoration Category:	Administration, Public Information and Science Management
Proposed By:	Molly McCammon, Director of Operations *Exxon Valdez* Oil Spill Trustee Council
Lead Trustee Agency:	All
Cost FY 95:	$590,700
Cost FY 96:	$590,700
Total Cost:	Unknown
Duration:	Ongoing
Geographic Area:	Oil spill area
Injured Resource/Service:	Multiple resources and services

INTRODUCTION

This project proposes to further develop an information management system that began with establishment of the Oil Spill Public Information Center (OSPIC) in September 1990 as a public repository for information and materials generated as a result of cleanup, damage assessment and restoration efforts following the *Exxon Valdez* oil spill. When fully developed, this system will contain distinct but interrelated components designed to make information that is relevant to the *Exxon Valdez* oil spill readily available for use by managers, scientists, and the public. This information will support restoration planning, management and policy making, scientific research and coordination, and public information. A central access point will be the OSPIC, with the potential for the establishment of additional access points as needs or interests are identified. In addition, this project would plan and implement an update and distribution program for EVOS information in digital format for use by the general public and cooperating agencies, managers and scientists.

NEED FOR THE PROJECT

An Information Management System supports the Mission of the Trustee Council in its efforts to restore the injured environment. Through the management, synthesis and dissemination of information and materials collected as a result of the *Exxon Valdez* oil spill, meaningful public

participation in the restoration process, as mandated by the settlement agreement between the state and federal governments and Exxon, is facilitated.

the OSPIC responds to inquiries from local, state, national, and international users, including but not limited to students (from preschool to graduate school), educators, scientists, government agency personnel, state and federal legislators, environmentalists, the business community, the media, the legal profession, and other libraries and information providers.

In addition, the OSPIC staff provides priority information service to the Trustee Council, the Executive Director, the Director of Operations, the Public Information Officer, and the staff-of the *Exxon Valdez* Restoration Office (EVRO). Through the reference services provided to restoration project personnel, the OSPIC serves all restoration activities.

Although the OSPIC does an excellent job at distributing what information is available, it is still unclear what information has been collected, what additional information exists or would be useful, how to acquire it, who maintains it, and how to access it. This project provides an opportunity for the Trustee Council to efficiently synthesize and disseminate this pool of information, thereby providing a lasting legacy of oil spill related work.

PROJECT DESIGN

A. Objectives

The objectives of the Information Management System are:

1. Compile, manage, synthesize, and disseminate currently available information about the *Exxon Valdez* oil spill and the Trustee Council (including damage assessment and restoration final reports) in a manner which can easily and effectively be utilized and understood.

2. Provide public access to local, state, national, and international users of this information through the Oil Spill Public Information Center.

3. Maintain the Trustee Council Administrative Record, a growing collection of over 2,000 documents produced for and by the Trustee Council, to allow public access and to document the decision making process of the Trustees.

4. Develop two distinct but interrelated products as described below, for initial use and distribution as part of an overall strategy to provide up-to-date information on the status of restoration and recovery as well as historical knowledge of the *Exxon Valdez* oil spill.

a. EVOS Information Summary. An interactive multimedia computer program will be developed to allow the user to explore *Exxon Valdez* oil spill information. This information will be organized to present a variety of topics in a logical, hierarchical structure. Information will be presented graphically with links to more detailed in-depth textual information. Emphasis will be given to general information about the oil spill, including but not limited to the natural history of the spill area and oil spill history, including response, oil spill sponsored research, and the status of ongoing restoration efforts. The end point for most users would be a citation for further reference or actual study results, the references' physical location, and availability in the form of an electronic bibliography.

This type of program will employ an easy to use mouse-driven graphical user interface and will be ideal for educational settings such as schools, nature centers, visitor centers and home or library use for the general public. The product development approach will provide a great deal of flexibility and provide for expansion as new information becomes available, thus providing a current status report on restoration and recovery to date.

b. Geographical Database Application. A wide variety of complex geographic data sets have been compiled and used by the many organizations involved with the response, damage assessment, and restoration stages of the *Exxon Valdez* oil spill. The electronic information is sophisticated in its structure and detailed in its history, making it difficult to access by non-technical staff. Conventional access has been through the maps and other reports disseminated by the technical services group and the OSPIC library. A systematic compilation of the data resources, combined with a "point and click" software interface, will permit a broader application of the geographic information which serves as a common base to a wide range of ecosystem management strategies. The existing strengths of institutional ties among the data producers will continue to serve as the backbone of this project, which is coordinated through the present repository site at the Alaska Department of Natural Resources, Land Records Information Section (LRIS).

Of great importance to the success of an up-to-date information system is support for database maintenance and annual updates. It should be noted that the goal of this project involves the dissemination of publishable information (analyzed data) only. It should not be confused with the dissemination and distribution of raw or unverified scientific data.

B. Methods

Integration

The Director of Operations will oversee the integration of Trustee Council-funded research in order to ensure cost-effectiveness and to maximize the ability to synthesize information and data collected from these efforts.

Reference Service

All OSPIC staff members respond to information requests made by visitors to the library, or by telephone, fax, mail, or electronic mail from around the world. During the past four years, the OSPIC staff have received over 6,500 visitors including visitors from 25 countries, responded to 8,500 on-site and off-site requests for information, processed 1,300 interlibrary loans of materials to and from other libraries, performed 1,200 on-line database searches, and distributed over 16,000 documents. The OSPIC also serves *Exxon Valdez* Restoration Office personnel, including the Executive Director, the Director of Operations, the Restoration Work Force, the Public Information Officer, and other agency personnel.

Cataloging

Materials acquired by the OSPIC staff are analyzed and described for entry into the OSPIC collection according to standard library practice. Materials are then made ready for the shelves with appropriate physical processing. The OSPIC collection is cataloged in the online database of the Western Library Network (WLN), a growing consortium of about 540 libraries in the western part of the United States, Canada, Australia, Korea, and Japan. Librarians from any member library can search the WLN database to locate OSPIC materials.

Computer Network and Technology

To conduct research and catalog new items for the collection, the OSPIC staff uses a Novell-based local area computer network linked by modem to WLN, DIALOG, and other databases. WLN's LaserCat, a CD-ROM product, functions as the OSPIC public access catalog. In addition, the OSPIC staff uses the Internet, a global network of over 10,000 computer networks in 85 countries linking 20 million users, to communicate with library users, seek out reference sources, and disseminate information. The OSPIC staff also provides Internet training to personnel in the *Exxon Valdez* Restoration Office.

Publication of Final Reports

Working in conjunction with the Director of Operations, the OSPIC staff coordinates the collection, publication and distribution of the Natural Resource Damage Assessment Final Reports and the Restoration Project Final Reports to the National Technical Information Service (NTIS), other libraries, local commercial copy centers and the general public. The OSPIC Technical Services Librarian began the coordination of the cooperative cataloging of interim reports with a cataloger at the Alaska State Library and will continue with the final reports.

Trustee Council Support

The OSPIC is a repository for documents produced for and by the Trustee Council, including meeting transcripts, agendas, budgets, work plans, correspondence, and public comments. The Trustee Council Administrative Record is maintained as a certified Administrative Record to track the decision making process of the Trustees and to address issues of accountability. The OSPIC staff distributes Trustee Council publications, such as annual reports, work plans, and information packets. An electronic mailing list is maintained online whereby interested persons may receive email notification of Trustee Council activities and publications via the Internet. The feasibility of additional applications of the Internet is currently being explored.

Development of New Products
Seven fundamental steps will be applied in a coordinated manner to the development of both the EVOS Information Summary and the Geographical Database Application:

1. Establish an interagency/multidisciplinary group to assist in the establishment of product objectives, identification of user needs, and testing of product design.

2. Develop product design and prototype programs.

3. Solicit input from chief scientist, executive director, restoration staff, principal investigators, and OSPIC to ensure accuracy and completeness of information, utility of design, and program integrity.

4. Fully implement product design with continued meetings with the interagency/ multidisciplinary group and cooperators to keep project focused and ensure accuracy.

5. Provide for demonstration and review of beta versions of final products to oil spill managers, scientists, and the public.

6. Develop documentation for both products, provide for review and publication.

7. Establish a mechanism to facilitate information exchange and provide for the periodic update and dissemination of both products.

C. Schedule

OSPIC
Quarterly and annual reports documenting library usage, acquisitions, expenditures, and user information needs will be submitted by the designated deadline. The quarterly distribution of the "OSPIC News" will begin in September 1994.

New product development

Nov 94	Establish an interagency/multidisciplinary group
Jan 94	Develop program design and prototype program
Feb-July 95	Solicit technical and scientific input from OSPIC, Restoration Staff ,and Principal Investigators in areas of expertise
Mar-July 95	Identify and develop information to be included in program templates. Refine product design and programming
Aug 95	Work with contractors, PIs, an interagency/multidisciplinary group, OSPIC, and restoration staff to QA/QC final product
Oct 95	Release of initial version of products
Nov 95	Peer Review With cooperation of an interagency/multidisciplinary group, OSPIC, Executive Director, Chief Scientist, and restoration staff, identify information gaps and areas to be targeted for annual update
Dec 95	Final release of products

D. Technical Support

The analyst programmer located in the Restoration Office provides maintenance of the LAN computer network and assistance in establishing a full-text online service for the public.

New product development will require support for digital scanning of slides and photographs. In addition, computer programming support and peer review will be needed in the initial product development stage and as a final review process to ensure that program development is technically correct and accurate oil spill information is presented.

E. Location

The project will be coordinated by the Director of Operations in the Anchorage EVOS Restoration Office, located at 645 G Street, Anchorage, Alaska, 99501, which is also the site of the Oil Spill Public Information Center. Users in the spill area and state, national and international users are served by mail, telephone, fax, and electronic mail.

PROJECT IMPLEMENTATION

The *Exxon Valdez* Restoration Office in Anchorage serves as the primary repository of information on the *Exxon Valdez* oil spill, related events and issues, and the actions of the EVOS Trustee Council in working towards restoration of the spill affected area. The OSPIC has been an integral part of the restoration process since it was established in 1990. A major restructuring by Executive Director Jim Ayers in early 1994 has maximized library efficiency and reduced operating costs. The OSPIC Director reports directly to the *Exxon Valdez* Oil Spill Trustee Council's Director of Operations.

Since the OSPIC collection is narrowly focused on a single, albeit complex event, the staff can provide more in-depth reference service than other libraries where *Exxon Valdez* oil spill related materials are only a small fraction of the entire collection. The OSPIC staff receives frequent referrals from local public, academic, and special libraries, as well as numerous school districts throughout the nation. In addition, they have developed extensive contacts with state and federal agencies, private sector organizations, universities, and all types of libraries. These contacts enhance the ability of the OSPIC staff to serve the information needs of anyone participating in the restoration process.

In order to maximize the utility of information generated through the restoration process to resource managers, researchers, and the public, it is essential that the new products described in the Objectives section be developed. The Department of Natural Resources Oil Spill Project Office will provide the central focus for their development. DNR, Land Records Information Section (LRIS) is the current repository of Oil Spill GIS data and as such will have an important role in data maintenance, interface implementation, and as the facilitator in coordinating the updating and dissemination of GIS information compiled as part of this project. OSPIC will provide a central location for access and distribution of all products.

The product development will be implemented in three phases:
Phase One focuses on the development and dissemination of the two programs described above.
Phase Two, to be proposed for funding in FY96, will focus on the integration of the two previously developed products, and cross platform compatibility. Both products will initially be designed with the objectives of Phase Two in mind.
Phase Three will focus on the establishment of an on-line connection for access to the two original programs.

COORDINATION OF INTEGRATED RESEARCH EFFORT

A further development of the Trustee Council's current Information Management System will go a long ways toward furthering the coordinated integration of the Trustees' research efforts This project provides a unique opportunity for all Principal Investigators to effectively disseminate the information gathered through their work to the general public, restoration staff, and the scientific community. The products generated as a result of this project have the potential to tie all EVOS-related research and historical information together into a meaningful picture for the lay person, scientist, and manager alike. As new information products are developed, meetings will be held with other information managers, GIS managers, and representatives of various scientific disciplines to ensure that the initial design maintains data integrity, achieves a common goal, and addresses the identified needs of principal investigators and managers in order to ensure coordination with the integrated ecosystem based approach to restoration.

FY 95 BUDGET ($K)

Personnel	300.6
Travel	6.4
Contractual	197.8
Commodities	24.5
Equipment	2.5
Subtotal	531.8
Gen. Admin.	58.9
Total	590.7

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Mussel Bed Restoration and Monitoring in Prince William Sound and Gulf of Alaska

Project Number:	95090
Restoration Category:	Monitoring (continuation of 94090)
Proposed By:	NOAA, ADEC, and DOI
Lead Trustee Agency:	NOAA
Cooperating Agencies:	ADEC, DOI
Cost FY 95:	$438,800 (includes $160,400 for data analysis and report writing of FY 94 work)
Cost FY 96:	$216,400
Total Cost:	Unknown; periodic monitoring until recovery
Duration:	Unknown; periodic monitoring until recovery
Geographic Area:	Prince William Sound, Kenai and Alaska Peninsulas
Injured Resource/Service:	Intertidal organisms, and higher level consumers including harlequin ducks, black oystercatchers, juvenile otters, salmon, and herring

INTRODUCTION

This project will monitor oil concentrations in mussel beds and sediments restored during 1994, monitor natural recovery levels of unrestored beds in Prince William Sound, Kenai, and the Gulf of Alaska, provide logistical and staff support for comprehensive sampling of mussels for pristane levels in Prince William Sound which index copepod populations, and will finish report-writing and analysis for the field work completed in 1994 (project 94090).

The persistence of *Exxon Valdez* crude oil underlying some dense mussel (*Mytilus trossulus*) beds in Prince William Sound (PWS) and the Kenai and Alaska Peninsulas began to cause concern in the spring of 1991 and was confirmed in annual surveys by NOAA's Auke Bay Laboratory (ABL) and the National Park Service (NPS).

In 1992, ABL documented 25 mussel beds in PWS with underlying sediment concentrations in excess of 10,000 μg/g total petroleum hydrocarbons (TPH). The lack of a clear indication of a reduction in petroleum hydrocarbon (HC) levels between 1992 and 1993 in mussels and underlying sediments led the Trustee Council to fund NOAA and ADEC to restore selected mussel beds in 1994. Approximately 15 mussels beds were restored. This proposal is for evaluation of the restoration process and monitoring of control (natural recovery) sites in PWS and for sampling and monitoring of oiled mussels beds along the Kenai Peninsula.

Field surveys along the Kenai and Alaska Peninsulas and Kodiak Archipelago were conducted in 1992 and 1993 to establish the geographic extent and intensity of oiling of contaminated mussel beds by the Department of Interior's National Park Service (NPS). There was no sampling in 1994. The National Biological Survey (successor to this work under NPS) portion of this study will be to resample oiled mussel beds in the Gulf of Alaska.

In addition, ABL will handle the logistics of sampling mussels for pristane analyses. Levels of pristane in mussels are an index for copepod populations. Copepods are alternative prey for marine predators which also prey on juvenile salmon. Measuring copepod production is important for the Prince William Sound Ecosystem Study, but the collection logistics have been integrated into this study.

NEED FOR THE PROJECT

The presence of substantial levels of petroleum hydrocarbons persisting under dense mussel beds in PWS and the Gulf of Alaska provides a continuing, potential source for oil to enter the food chain, impacting higher consumers, especially harlequin ducks, oystercatchers, juvenile otters, and humans. There is a possible link between the presence of oiled mussels and the disruption of reproduction in harlequin ducks and increased mortality in oystercatcher chicks.

Restoration (cleaning) of selected mussels beds (approximately 15 mussels beds were restored in PWS in 1994) should reduce potential exposure to HCs in higher predators such as harlequin ducks, oyster catchers and juvenile otters. Sampling mussels and underlying replacement sediments, and comparing changes in size and density of mussels is necessary to evaluate the success of this restoration method. Periodic sampling for hydrocarbons in oiled mussel beds along the Kenai Peninsula is proposed to document their recovery progress. This information is needed for decisions relevant to cleaning mussel beds in the future in both Prince William Sound and the Kenai Peninsula. Additional potential oiled mussels beds brought to the attention of the Trustee Council by the public and other projects will also be examined.

Logistics for collecting mussels for pristane analyses is complex as periodic sampling over the spring and early summer needs to occur to measure changes over this period. Mussels from approximately 32 sites in PWS are being collected. Logistics for collecting mussels for this purpose have been combined with this project to reduce overall field costs. Pristane analyses will be used to index copepod production which is used to evaluate prey-switching hypotheses by the Prince William Sound Systems Investigations. It is important for their research concerning salmon and herring.

PROJECT DESIGN

A. Objectives

1. To evaluate the physical and biological stability of the 1994 restored oiled mussels beds by measuring petroleum hydrocarbon concentrations in mussels and underlying replacement sediments, measuring the size of the beds and calculating density of mussels (NOAA, ADEC).

2. To monitor natural recovery in levels of petroleum hydrocarbons in mussels and underlying sediments in oiled mussel beds in PWS not restored (NOAA, ADEC).

3. To monitor recovery in levels of petroleum hydrocarbons in mussels and underlying sediments in oiled mussel beds along the Kenai and Alaska Peninsulas (NPS).

4. To provide logistic and staff support for comprehensive sampling of mussels for indexing pristane levels in PWS. This project is closely coordinated among several resource groups (NOAA).

5. To complete analysis and report writing for the 1994 field work.

B. Methods

Sampling mussels, underlying sediments, and replacement sediments will follow the methods used in previous years and consists primarily of triplicate pooled samples of mussels and underlying sediments for petroleum hydrocarbon analyses. Beds cleaned in 1994 as well as control (natural recovery) beds will be sampled in PWS. Similar experimental design is used for documented oiled mussels beds along the Kenai and Alaska Peninsulas.

To assess physical and biological stability of a restored bed, other measurements will be taken to compare with precleaned bed condition, i.e. bed size and density of mussels. Photos will also be taken for comparison purposes.

Sediment samples will be analyzed by ultraviolet fluorescence. Selected sediments and mussels then will be analyzed by gas chromatography/mass spectroscopy (GC/MS) for quantitative measurements of HC analytes. All mussels collected for pristane concentrations will be analyzed by GC/MS.

Freezing, chain-of-custody procedures and record keeping will follow Natural Resource Damage Assessment protocol. Data will be analyzed using standard statistical methods, mapped using ABL's computerized data mapping system, and entered into the *Exxon Valdez* Restoration Hydrocarbon Database.

C. Schedule

Jan-April 1995	Logistics planning; evaluation of 1994 data for sites to actually sample; initiation and implementation of contracting for aircraft charter; and other preliminary planning for 1995 field season.
April 1995	Draft Report Submitted for 1994 field work.
April 1995	First PWS 1995 field trip during low tide series for sampling mussels at some established sites for pristane analyses.
May 1995	Second PWS 1995 field trip during low tide series for sampling mussels at some established sites for pristane analyses. Site visits to 1994-restored mussel beds and to sample and evaluate restoration process. Sampling of mussels and underlying sediments will be done at several control (natural recovery) sites.
June 1995	Third PWS 1995 field trip during low tide series for sampling mussels at some established sites for pristane analyses. Site visits to 1994-restored mussel beds and to sample and evaluate restoration process. Sampling of mussels and underlying sediments will be done at several control (natural recovery) sites. During low tide series, site visits and sampling of mussels and underlying sediments will be conducted in the Gulf of Alaska.
June-Oct 1995	Ongoing chemical and data analyses.
Oct 95-April 96	Ongoing chemical and data analyses.
April 1996	1996 Annual Report

D. Technical Support

With the exception of transportation contracts, NOAA's Auke Bay Laboratory, the National Biological Survey and AK Department of Environmental Conservation will provide all technical support.

E. Location

Prince William Sound, Kenai and Alaska Peninsulas.

PROJECT IMPLEMENTATION

Management of this study is proposed to be led by NOAA's ABL with one objective the responsibility of the NBS. ADEC will participate in the evaluation of restored mussel beds and sampling for natural recovery in unrestored oiled mussel beds.

All three agencies have accomplished previous research and restoration work related to this project, 1991-1994 (1994 Study #94090) and have site experience, access to site and HC data, and NOAA's ABL is the only laboratory currently conducting HC analytical analyses for Trustee environment samples.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Logistics and staff time will be shared and closely coordinated with field expertise needs and other activities under other projects particularly the proposed work on population structure of blue mussels in PWS. Data from this project will continue to be shared with subtidal sediment studies and injured species studies (i.e. harlequin duck, etc.). Logistic costs may be reduced for the Kenai and Alaska Peninsula portion by combining resources with the proposed Shoreline Assessment project.

All chemical data from environmental samples will become part of the *Exxon Valdez* oil spill database managed by ABL for the Trustees; as such, data can be shared with interested parties.

FY 95 BUDGET ($K)

Personnel	265.0
Travel	28.5
Contracts	69.5
Commodities	27.2
Equipment	4.0
Subtotal	394.2
Gen. Admin.	44.6
Total	438.8

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Recovery Monitoring of Prince William Sound Killer Whales

Project Number:	95092
Restoration Category:	Monitoring (continuation of 94092)
Proposed By:	NOAA
Cost FY 95:	$110,000
Cost FY 96:	$27,200 (includes data analysis and report writing costs)
Total Cost:	Unknown
Duration:	20 years (monitoring every other year; 10 samples are required to achieve statistically reliable information. If recovery of AB pod to 36 members occurs prior to complete sampling period, project can be terminated.)
Geographic Area:	Prince William Sound
Injured Resource/Service:	Killer whale

INTRODUCTION

Photographs of individual killer whales occurring in Prince William Sound (PWS) were collected from May to September 1989-91 to assess the impact of the EVOS on killer whale abundance and distribution (NRDA studies) and from July to September 1993 to determine the recovery status of AB pod.

Photographic analysis of resident pods revealed 14 animals missing from AB pod over the three-year period (1989-1991). Despite considerable searching effort in PWS (1989-1993), in Southeast Alaska (1989-94), and from the Kenai Peninsula to the Bering Sea (1992 and 1993), the missing whales have not been observed. Given the stability of resident pods, we assume that the missing whales are dead. The mortality rates for AB pod ranged from 3.1% in 1988 to 19.4% in 1989, 20.7% in 1990, and 4.3% in 1991. Zero mortality occurred in 1992 and in 1993. The adult annual mortality rate of killer whales is usually less than 2%. Annual pod mortality rates on the order of 20% are unprecedented for North Pacific killer whales.

The cause(s) of the disappearance of 14 whales from AB pod is unknown; however, we assume that the whales are dead from natural causes, a result of interactions with fisheries, from the EVOS, or a combination of these causes.

No new calves were born into AB pod in 1989 or 1990. There was one calf born into AB pod in 1991, two born in 1992 and one born in 1993. AB pod size in 1988 was 36; in late 1993 the pod had 26 members. The pod appears to be growing again. Recovery of AB pod to pre-spill levels (36 whales) could take 10 to 15 years given the current age and sex structure of the population. Killer whales will have fully recovered when the injured pod grows to at least 36 animals (1988 level).

We propose to continue monitoring AB pod to document natural recovery of this resident killer whale pod. This project will build on the research and monitoring data collected for the years 1989-1991 and 1993.

NEED FOR THE PROJECT

The proposed project on Prince William Sound killer whales will monitor the natural recovery of AB pod. Recovery to a pre-spill level of 36 animals is the restoration objective defined in the "Invitation to Submit Restoration Projects for FY 1995", dated 16 May 1994.

PROJECT DESIGN

A. Objective

1. Count the number and individually identify killer whales within AB pod.

2. Determine killer whale pod structure and integrity within AB pod.

3. Determine killer whale reproductive rates and trends in abundance for AB pod within Prince William Sound.

B. Methods

Weather permitting, an average of 8 to 10 hours per day (six days per week) will be spent conducting boat surveys searching for or photographing whales. If whales are not located in known areas, a general search pattern will be implemented. This search method will consist of running for 30 minutes while scanning for killer whales and then stopping for ten minutes to scan with binoculars and listen for killer whale calls using a hydrophone. This will be repeated until killer whales are either sighted or until the end of the day. When reports of killer whales are received from sport and commercial fishing vessels, tug boats, and State ferries, researchers will break trackline and move to the area where whales are reported.

When encountered, killer whales will be photographed and survey forms completed. The vessel approximates the whale's course and speed. An approach within 30-60 meters of the whales left side is required. The whale's dorsal fin and saddle patch are then photographed with 35 mm camera systems equipped with motor drives and 300 mm lens set at 1/1000th sec shutter speed, or the highest speed possible. Black and white Fuji 1600 film will be used. Exposed film is labeled with date, roll number, photographer's initials, location, species code, and ASA setting.

Multiple encounters are needed throughout the season with AB pod because the pod may temporarily fragment while foraging. Because AB pod members frequently travel with other resident pods (associated with other pods 80% of the time), photographs of all killer whales encountered in Prince William Sound will be collected.

All exposed film will be analyzed for individual identification. Sub-standard photographs (not showing enough detail or improper angle/side) are not used. Photographs are then grouped by individual. Photographs collected will be compared to NMML's photographic database for the years 1989 to 1991 and 1993. Once all photographs are examined, it is then possible to determine 1) if all members of the pod were present, 2) if pod structure and integrity are similar to previous years, and (3) if new whales (calves) were born into the pod. Any missing animals are noted.

Daily effort logs will be maintained. These logs permit a quantification of the amount of time searching for whales versus photographing whales and depicts the daily vessel trackline. Researchers will be required to conduct line transect surveys while searching for whales. This will allow standardization of effort across years -- a requirement for understanding distribution patterns of killer whales. All cetaceans observed during survey work will be listed.

Killer whale calves of the year are identified by size, their mothers identified, and average pod birth rates calculated. Mortality is assumed based on the absence of an identified animal from its pod for more than one year. Due to the proposed sampling strategy (every other year beginning in 1995) it will not be possible to determine mortality the year immediately following the field season. A period of two years will lapse prior to establishing the fate of a missing whale.

C. Schedule

Field Season:	July to September 1995 (every other year)
Data Analysis:	October to December 1995
Draft report of 1995 research:	January 1996
Final report of 1995 research:	March 1996
Comprehensive report:	November 1996

A comprehensive report would be completed every other year beginning in 1996. Data collected for all years beginning in 1989 would be updated pending the results of each field season. As more data are collected, a detailed analyses and subsequent interpretation of existing data can occur. This will lead to a better understanding of the biology and life history of Prince William Sound killer whales.

D. Technical Support

Technical support will be provided by the research/administrative staff of the Alaska Fisheries Science Center, National Marine Mammal Laboratory, Seattle, Washington.

E. Location

Field work conducted under this project will be restricted to Prince William Sound. Laboratory work (data analysis/archiving/reporting) will take place at the National Marine Mammal Laboratory, Seattle, Washington.

PROJECT IMPLEMENTATION

Scientific personnel from the National Marine Mammal Laboratory would implement this project. Scientific/administration staff at the National Marine Mammal Laboratory are thoroughly familiar with all aspects of the proposed research. Previous photographic data associated with killer whale EVOS studies is archived at NMML. Photographic data collected in 1995 would be archived at NMML in a similar manner. NMML has the facilities to properly archive and organize the data to ensure its protection over the years. The accessibility of data is greater if stored at a government facility. By centralizing the data at a government facility, staff at NMML have been able to encourage additional studies of existing information. As an example, studies were conducted on 1) hearing capabilities of killer whales; 2) the effects of noise on killer whales; 3) killer whale aging studies; 4) killer whale foraging and 5) two separate projects are being considered by graduate students. All these studies have been supported by NMML using data collected on killer whales collected during EVOS studies. Research continuity is critical to the overall success of this project; NMML has been involved since the initiation of this project. Since 1989, a critical network has also been established. NMML researchers work closely with other EVOS Principal Investigator thereby ensuring the integration of marine mammal data throughout Prince William Sound. In addition, the National Marine Fisheries Service has a legal research mandate to conduct studies on cetaceans and a mandate to manage populations under the Marine Mammal Protection Act.

COORDINATION OF INTEGRATED RESEARCH EFFORT

All EVOS project leaders conducting field research in Prince William Sound will be contacted by the Principal Investigator of the killer whale study. A brief killer whale project description will be provided to each Project Leader. We will encourage other research teams to provide

sighting information (on a not-to-interfere basis with their ongoing work). We will also routinely contact other Project Leaders to obtain information on current fisheries information. This fisheries information may be relative to the recovery rates of killer whales. If the monitoring project on killer whales is merged with the killer whale predation project on harbor seals being proposed by NMML, coordination on a much larger scale occurs.

FY 95 BUDGET ($K)

Personnel	23.0
Travel	6.0
Contractual	50.0
Commodities	24.0
Equipment	0.0
Subtotal	103.0
Gen. Admin.	7.0
Total	110.0

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Administration, Public Information and Science Management

Project Number:	95100
Restoration Category:	Administration, Public Information and Science Management
Proposed By:	James R. Ayers, Executive Director *Exxon Valdez* Oil Spill Trustee Council
Cost FY 95:	$3,596,900
Cost FY 96:	$3,500,000
Total Cost:	Unknown
Duration:	Ongoing (this project funds the annual operating costs of the Trustee Council's restoration program)
Geographic Area:	Oil spill area
Injured Resource/Service:	Multiple resources and services

INTRODUCTION

The Administration, Public Information and Science Management project provides for overall management, administration and implementation of the Trustee Council's restoration program. This project makes extensive use of existing Trustee Council agency structures to keep administrative costs to a minimum.

The proposed FY 95 budget of $3,596,900 for Administration, Public Information and Science Management represents a substantial reduction in costs relative to the FY 94 budget of $4,200,000. The FY 95 project represents the final step in reorganization of the administration of the Trustee Council executive staff and operations. Specific components of the Administration, Public Information & Science Management project include:

Office of the Executive Director — The budget for the Executive Director includes salaries, benefits, travel, office space, supplies, printing costs, contractual services, utilities, and other such items as may be necessary for efficient operation of the Juneau office of the Executive Director and the Director of Administration. In addition to budget and audit responsibilities, the Director of Administration is assuming the duties once performed by the six-member Finance Committee: developing fiscal procedures, adherence to the procedures, and ensuring overall fiscal standards and reporting for accountability, and efficiency.

Chief Scientist: Science Review Board and Peer Review — The Trustee Council and the Trustee Council-supported principal investigators need access to the best possible scientific knowledge and understanding concerning injured resources and services. This information has been provided continuously by the Chief Scientist and expert peer reviewers since the injury assessment process started in 1989. It is essential that this expertise be retained on an upon-request basis to provide the unbiased scientific review and continuity essential to perform the best possible scientific work. This component will also include the Science Review Board, when adopted by the Trustee Council.

Operations — The budget for Operations includes salaries, benefits and travel for staff that perform the key planning, coordination, communications and project management functions of the Trustee Council. This budget also includes funds for public meetings, teleconferences, Trustee Council meetings, newsletters, brochures and other publications, as well as the operating costs for offices in the Simpson Building in Anchorage.

Public Advisory Group and Community Involvement — The Public Advisory Group (PAG) consists of 17 members, plus two ad-hoc members from the State Legislature, representing 12 principal interest groups and five members from the public-at-large. The role of the PAG is to provide advice to the Trustee Council on such items as the annual work plans, budgets, and the Restoration Plan. The budget reflects the administrative support expenses for the PAG, including staff support, which is now being provided through the state in order to provide more user-friendly travel reimbursement. In addition, this component provides for a series of public meetings throughout the spill area during the year.

Restoration Work Force — The FY 95 budget for the Restoration Work Force reflects support for the six Trustees with a budget of $150,000 per Trustee Council agency. This funding will be used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. (Agencies also receive funding for project management in association with individual projects.) Costs involved are salaries, benefits, travel, per diem, equipment and commodities.

NEED FOR THE PROJECT

The project will provide the essential management and administration necessary to efficiently implement the restoration program developed by the Trustee Council.

PROJECT DESIGN

A. Objectives

The fundamental objective of the Administration, Public Information and Science Management project is implementation and management of the Trustee Council's direction to pursue a comprehensive, balanced approach to restoration built upon three basic elements:

- Research and Monitoring
- General Restoration
- Habitat Protection

Specific objectives for FY 95 include:

1. Implementation of a Final Restoration Plan, pending completion of the NEPA Environmental Impact Statement process;

2. Implementation of the approved FY 95 Work Plan;

3. Continued oversight and management of the Trustee Council science program that includes the peer review and project evaluation process under the direction of the Chief Scientist as well as development of a Science Review Board;

4. Sponsorship of an Annual Forum that brings together scientists, agency staff, Trustee Council staff and members of the general public to review the status of injured resources and services and help devise and refine appropriate restoration strategies through an adaptive management process;

5. Further refinement of draft monitoring strategies for injured resources;

6. Further habitat evaluation, appraisals and negotiation with potentially willing sellers as part of both the Large Parcel and Small Parcel Habitat Protection Programs;

7. Continued work on the proposed physical improvements to the Institute of Marine Science facilities in Seward;

8. Regular meetings and interaction with the Public Advisory Group (PAG) as one means of gathering public input into the Trustee Council process;

9. Production of an Annual Report;

10. Publication of a newsletter six times/year regarding activities of the Trustee Council;

11. Development of the FY 96 Work Plan, including opportunity for substantial public involvement and review of the work plan;

12. Oversight and management of the Trustee Council's FY 92-95 Work Plan projects and expenditures, including the production of quarterly reports that track the status of Trustee Council authorized projects;

13. Completion of a financial audit; and

14. Development of an inventory tracking system.

B. Methods

All Trustee Council operations are governed by the state and federal laws and regulations that apply to the respective agencies that comprise the Trustee Council.

C. Schedule

The Trustee Council operates on the federal fiscal year (Sept 30 - Oct 1).

D. Technical Support

Trustee Council operations require limited technical support with computer support services provided by in-house staff.

E. Location

The Trustee Council maintains the Executive Director's Office in Juneau (709 west 9th Street, Juneau, Alaska, 99801) and a Restoration Office in Anchorage (645 G Street, Anchorage, 99501).

PROJECT IMPLEMENTATION

The Trustee Council, established under the terms of a court approved civil settlement, is comprised of the Commissioner of the Department of Environmental Conservation, the Commissioner of the Department of Fish and Game; the Attorney General of the State of Alaska; the Secretary of the Department of the Interior; the Secretary of the Department of Agriculture; and the Director of the National Oceanic and Atmospheric Administration. In order to manage the Settlement as directed by the Trustee Council, an Executive Director has been hired who oversees a small core staff while making use of existing Trustee Council's agency structures to keep administrative costs to a minimum.

COORDINATION OF INTEGRATED RESEARCH EFFORT

As part of an adaptive management process, the Trustee Council will sponsor an Annual Forum that will bring together scientists, agency staff, Trustee Council staff and members of the general public to review the status of injured resources and services and help devise and refine appropriate restoration strategies. This is one mechanism by which research sponsored by the Trustee Council will be coordinated and integrated. Additionally, during FY 95, a Science Review Board will be established and used as a mechanism to provide overall coordination and integration of the Trustee Council science program.

FY 95 BUDGET ($K)

Personnel	1811.0
Travel	268.5
Contractual	1108.5
Commodities	70.4
Equipment	30.5
Subtotal	3288.9
Gen. Admin.	308.0
Total	3596.9

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Kenai River Ecosystem Restoration Pilot Enclosure Study

Project Number:	95105
Restoration Category:	General Restoration (new)
Proposed By:	ADFG
Cooperating Agency:	DOI
Cost FY 95:	$404,800
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Skilak Lake, Kenai Peninsula
Injured Resource/Service:	Sockeye salmon, commercial fishing

INTRODUCTION

This study stems from the results of the 1989 *Exxon Valdez* oil spill (EVOS). During the summer of 1989, the presence of oil in the waters of Cook Inlet resulted in an overabundance of sockeye salmon escaping into the Kenai River system. The injury assessment of the Kenai River ecosystem has focused on changes to production of sockeye salmon caused by large escapements. This study is an extension of ongoing investigations of injury assessment of the Kenai River ecosystem with emphasis on productivity of sockeye salmon. This study will initiate a pilot restoration project using enclosures in Skilak Lake to provide an experimental design to determine possible restoration strategies. The enclosure studies will allow experimental manipulation of fish density and nutrients on a limited scale to determine the costs and benefits of larger scale programs, such as changing fry recruitment through escapement changes, or nutrient additions to simulate fish carcass decomposition. This program emphasizes a cooperative State/Federal involvement to insure goals are designed to meet restorative objectives of both the Alaska Department of Fish and Game and the concerns of the Kenai National Wildlife Refuge. The presence of the Fish and Wildlife Service personnel at Skilak Lake throughout the summer in the course of normal refuge operations provides the opportunity for cost effective management of the enclosures. In addition, the expertise in sockeye salmon studies of the National Biological Survey research laboratory (formerly US Fish and Wildlife Service) in Anchorage provides additional local expertise and facilities.

Commercial fishing for sockeye salmon in 1989 was curtailed in upper CI, the outer Chignik districts, and the Kodiak areas due to presence of oil in the fishing areas from the EVOS. As a result, the number of sockeye salmon entering four important sockeye producing systems (Kenai/Skilak, Chignik/Black, Red, and Frazer lakes) and two less important lake systems (Akalura and Afognak or Litnik lakes) greatly exceeded levels that are thought to be most productive. Sockeye salmon spawn in lake associated river systems. Adult salmon serve an extremely important role in the ecosystem, providing food for marine mammals, terrestrial mammals, and birds. Additionally, carcass decomposition serves to charge fresh water lake systems with important nutrients. Juvenile salmon, that rear in lakes for one or two years, serve as a food source for a variety of birds, fish and mammals. Sockeye salmon are also an important subsistence, sport, and commercial species. The ex-vessel value of the commercial catch of sockeye from these lake systems has averaged about $42 million per year since 1979, with the 1988 catch worth $115 million. Sockeye salmon returns to the Kenai River system support one of the largest recreational fisheries in the state.

Overly large spawning escapements may result in poor returns by producing more rearing juvenile sockeye than can be supported by the nursery lake. In general, when rearing fish abundance greatly exceeds the lake's carrying capacity, prey resources are altered by changes in species and size composition with concomitant effects on all trophic levels. Because of such changes, juvenile sockeye growth is reduced, mortality increases, larger percentages holdover for another year of rearing; and the poor quality and small size of smolts decreases marine mortality. Where escapements are two to three times normal levels, the resulting high juvenile densities crop the prey resources to the extent that more than one year is required to return to normal productivity. Rearing juveniles from subsequent brood-years suffer from both the poor quality of forage and from the increased competition for food by holdover juveniles. This is the brood-year interaction underlying cyclic variation in the year class strength of anadromous fish. Recent findings from the Kenai River drainage suggest major economic injury to commercial, subsistence, and sport fisheries may result because of overescapement associated with fisheries closures caused by the 1989 oil spill. Smolt numbers emigrating from the Kenai River in the spring of 1992 and 1993 were less than one-fiftieth the numbers estimated in 1989. This suggests a likely possibility of future returns below existing escapement goals.

Recent studies on the Kenai River system indicate Skilak Lake fall fry are significantly smaller than nearby Tustumena Lake, a system that had normal escapements during the past decade. Data collected in 1993 suggest this trend has continued; Tustumena Lake fall fry were significantly larger than Skilak Lake. The estimated abundance of fall fry compared with total smolt estimates for Tustumena and Skilak lakes imply that the overwintering period resulted in major mortality of rearing fry in Skilak. We have also discovered an inverse relationship of egg-bearing *Diaptomid* copepods with fry abundance in Skilak Lake suggesting selective depletion of this food resource. Nutrient data does not suggest nutrient depletion as the major cause of the decline of sockeye salmon in Skilak Lake. However, the low values of reactive phosphorous in the lake (less than 5 $\mu g l^{-1}$) suggest nutrients may be limiting, and may have some potential for accelerating the recovery of the system. Nutrient additions have been used in many Alaskan and Canadian sockeye salmon systems to improve productivity of oligotrophic systems by simulating the natural nutrient supplementation achieved through salmon carcasses.

However, glacial lakes have had limited investigations, and there is limited understanding of the ecosystem dynamics of nutrient cycling in glacial lakes.

NEED FOR THE PROJECT

Restoration activities potentially possible for the Kenai River include adjustment of escapement levels, enhanced egg to fry survival through hatchery fry production, barren system stocking, smolt stocking and nutrient enrichment. All of these activities have potential to cause harm if improperly applied. The proposed project will provide experimental evidence as to the efficacy of some of these activities. Without such a program, we may face continued uncertainty as to what action to take in the future to restore the Kenai River sockeye salmon runs.

Injury assessment investigations to date have provided inferences as to the causal mechanism of the decline of sockeye salmon production from the Kenai River ecosystem. Although correlative studies and comparisons of results from neighboring Tustumena Lake provide valuable insights, major uncertainty remains because of the lack of true controls and replicates inherent in the study design used to date. Without bold experimental manipulations of the affected lakes through major changes of escapement or by whole lake nutrient enrichment programs, the development of a restoration plan with any reasonable expectation of success is unlikely. The use of enclosures, with the treatments outlined in this proposal are much more likely to provide insights as to what should be the future restorative actions without the biological, economic, and political risks associated with large-scale restorative activities within the Kenai River lake ecosystems. By understanding the mechanism which caused the collapse in sockeye salmon smolt production in the Kenai River system, valuable information will be available for fisheries management of the future. The resources affected have had annual economic value in excess of $100 million dollars in direct commercial value and have had major economic benefit to the sport fishing industry, and importance to subsistence and personal use fishers on the Kenai Peninsula. The forecasted decline has shown no sign of recovery. The investment in knowledge on glacial lake ecology will also provide benefits to other sockeye salmon investigations, such as the glacially influenced Coghill Lake in Prince William Sound.

PROJECT DESIGN

This study will be located within Skilak Lake on the Kenai Peninsula. Specific locations of the enclosures will be chosen to minimize conflict with public users and through the permitting and cooperative effort of the Kenai National Wildlife Refuge Staff. The proposed study will be conducted for a minimum of two growing seasons (years).

A. Objectives

1. Test hypothesis of altered vertical migration by comparing vertical movement of fish and zooplankton within enclosures (a through d below) and with samples collected external to enclosures (pelagic lake samples).

2. Determine top down trophic level response by comparison of zooplankton and phytoplankton community compositions and biomass with enclosure treatments (a through d below) and with samples collected external to enclosures (pelagic lake samples).

3. Determine bottom up trophic level response by comparison of nutrient flux and phytoplankton, zooplankton, and fish composition and biomass responses to nutrient additions (enclosures c and d) with controls and other non-nutrient treatments.

4. Integrate the results of the enclosure studies to the time series of data collected from Skilak, Tustumena, and Kenai lakes in formulating optimal restoration strategies for these systems.

Enclosure types in replicate:

a. Fish removed from enclosure (no treatments or fish added).
b. Fish added to approximate densities observed in the western basin of Skilak Lake.
c. Nutrients added to simulate optimal phosphorous and nitrogen nutrient loading (fish excluded) using nutrient loading models developed for Alaskan and Canadian sockeye salmon lakes.
d. Nutrient additions to simulate optimal phosphorous and nitrogen loading and fish added to approximate densities observed in the western basin of Skilak Lake (treatment b & c combined).

B. Methods

These studies will be conducted concurrently with ongoing investigations of the biotic communities of Skilak, Kenai, and Tustumena lakes (proposed 1994 sockeye salmon overescapement work plan). These studies have provided insight into the apparent collapse of the Kenai River sockeye salmon fishery over the past several years. Since over 70% of the sockeye salmon production in the Kenai River system has been produced from fry rearing in Skilak Lake, this system is chosen for further experimental studies.

Enclosures will be deployed in a protected area in Skilak Lake, with the location developed jointly with the U.S. Fish & Wildlife Service. Eight enclosures of approximate 8 m diameter and a depth of approximately 25 m will be deployed using four replicate treatments following the design (2 X 2 factorial) of Mazumder et al. In addition, samples will be collected external to the enclosures for comparative control on the effect of enclosures and comparisons will be made with the other ongoing limnological studies of Kenai, Skilak, and Tustumena lakes. Fish added to the enclosures will be collected from the pelagic zone of Skilak Lake in late

June/early July and will be less than 35 mm FL.

The enclosures will be sampled biweekly and the data analyzed similar to the methods used for the open water studies with modifications from Mazumder et al. These will include seasonal nutrient trends, water temperature, turbidity, phytoplankton community analysis, chlorophyll *a*, zooplankton community composition and biomass, fish AWL (age, weight, lipid content, length) and other water chemistry parameters. These data will be analyzed to measure bottom up and top down lake ecosystem control mechanisms and will be used to better interpret inter-annual variations in lake limnological parameters. This analysis will provide insight as to the most effective strategies to initiate in the lake for restoring lost or reduced productivity of sockeye salmon to this freshwater ecosystem.

C. Schedule

Although desired to be implemented in the spring of 1994, logistical planning may make this impossible. Enclosure design and construction will require customized modifications to insure the enclosures can be deployed in the conditions anticipated in Skilak Lake. Enclosures will be obtained through State of Alaska procurement procedures which may result in delays of implementation until the spring of 1995. The enclosures will be deployed as soon as we receive them from the manufacturer. Data obtained through monitoring of the Kenai River system lakes will be used to fine tune study design if deployment is delayed to the spring of 1995.

Laboratory analysis of field samples continues 12 months a year and will be in progress throughout the study period. This analysis includes samples of zooplankton, water chemistry, juvenile fish scales and otoliths, weight/length of juvenile fish, lipid and N15 from juvenile fish.

Field data collection efforts begin in mid April for field deployment in May. Data are collected throughout the summer and terminated when the lakes form an ice cover at approximately December 1st. The weight and lipid content of fish in the enclosures will be determined by lethal sampling in September. Sampling of vertical distribution of fish, zooplankton, and related water quality and physical data are collected at preset intervals throughout the summer. Reporting activities and data summarization continues throughout the year with the primary effort occurring in September through December with interim reports completed by May 15th of each year of the study. Final report for this study will be completed by June 1, after the completion of the final year of field work. Tentative completion date for this study will be June 1, 1996.

Initiate field studies	May 1995
Complete field studies	December 1996
Draft Report for FY 94	March 1996
Final Report	June 1997

D. Technical Support

Administrative support is provided by the Administrative Division, Habitat Division, and Commercial Fisheries Management and Development Division staff of the Alaska Department of Fish and Game. The project leader and his assistants are not funded by this project and are supported with general funds from the State of Alaska. Most laboratory analyses are conducted by the limnology laboratory in Soldotna. Carl Burger (National Biological Survey) will assist with data analysis and report publication preparation. Asit Mazumder of the Universite de Montreal will be contracted as a consultant in the design and analyses of this study with assistance from graduate or post-doctoral students under his direction. Dr. Mazumder has over a decade of experience in these types of investigations on northern lakes. This study is integrated with ongoing studies by the Commercial Fisheries Management and Development Division on the Kenai Peninsula.

E. Location

The investigations will occur on Skilak lake on the Kenai Peninsula. Specific locations will be developed through a coordinated effort with NBS and the US Fish and Wildlife service staff in Soldotna. The locations will be chosen that meet technical objectives without intruding upon normal use patterns of the Kenai National Wildlife Refuge.

PROJECT IMPLEMENTATION

The project is integrated with the ongoing studies of the limnology of Skilak Lake. Special use permits, sources of fish for the enclosures, and the integration of the lake studies with the experiments require the work to be integrated with these studies. The deployment of this type of equipment and its design require a great deal of scrutiny in sight selection and enclosure engineering. There are only several experts in North American who have had adequate experience with these types of studies to provide the necessary technical guidance to insure a high probability of success. For the results to be comparable, laboratory and chemistry analyses should be done with the same facilities used in the Skilak Lake limnology studies. The dangerous conditions on Skilak Lake require some on sight experience to avoid danger to participating personnel. Experienced divers in low visibility will also be required to install the enclosures. These reasons suggest that this investigation be awarded to the same contractor or agency completing the Skilak Lake limnology studies.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This study requires on-site data collection of biological specimens both within and external to the enclosures; however no environmental effect will occur beyond that of traditional fisheries management data collection, that is within existing collecting permits or Federal special use permits issued to the Department of Fish and Game for scientific data collection activities. A special use permit will be requested through our cooperative agency, the U.S. Fish and Wildlife Service, prior to deployment of the enclosures. These studies will be closely integrated with the lake limnological studies and fry rearing investigations conducted by the same authors.

FY 95 BUDGET ($K)

Personnel	106.0
Travel	9.3
Contractual	206.7
Commodities	37.5
Equipment	15.0
Subtotal	374.5
Gen. Admin.	30.4
Total	404.8

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Subtidal Monitoring: Eelgrass Communities

Project Number:	95106
Restoration Category:	Monitoring (new)
Proposed By:	ADFG
Cost FY 95:	$200,400
Cost FY 96:	$432,100
Total Cost:	$632,500
Duration:	2 years
Geographic Area:	Western Prince William Sound
Injured Resource/Service:	Subtidal organisms

INTRODUCTION

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

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

1990: Almost all components of the eelgrass habitat were affected by the EVOS by the summer of 1990. The health of the benthic community outside the eelgrass bed, at 6-20 m depths, was generally less robust at oiled sites than at control sites. The oiled sites had significantly less total invertebrate abundance; several dominant invertebrate taxa had less abundance and/or biomass. These included families of clams that are important food for sea otters. Another group less prevalent at oiled sites were the oil-sensitive benthic amphipods. Measured parameters less prevalent at the oiled sites in the eelgrass bed ($\leq$ 3 m) included eelgrass turions and flowers, benthic amphipods, and helmet crabs (*Telmessus cheiragonus*). However, the benthic community in the bed had greater total invertebrate abundance and biomass at the oiled sites, primarily attributable to small epifauna attached to the eelgrass blades.

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

1993: The 1993 data, four years after EVOS, revealed that the oiled sites had not yet recovered. Furthermore, the data tended to resemble 1990, especially in the bed (≤ 3 m) where densities of eelgrass flowers and oil-sensitive benthic amphipods were greater at control sites. Total abundance and biomass was greater at oiled sites, mainly because of small epifauna attached to the eelgrass blades. In the deep region (6-20 m) infaunal bivalve abundance was less at oiled sites.

After the 1991 sampling it was apparent that recovery was underway, however, the 1993 data reveals a reversal, suggesting that some segments of the community are once again in a toxic phase (e.g., amphipods) and other segments reflect enhancement (e.g., epifauna on eelgrass).

We know from other studies and from our work that several of the species impacted are important links to higher trophic levels. For example, benthic amphipods are important prey to a variety of sea birds and fishes. The crab *Telmessus* feeds on eelgrass, *Musculus* mussels, and other epiphytes on eelgrass. In turn, *Telmessus* serves as prey for a variety of vertebrates, including sea otters, river otters, and birds. In addition, *Musculus* is a primary component of the diet of juvenile cod that are abundant in the eelgrass habitat. As noted earlier, some of the infaunal bivalves are important food for sea otters.

NEED FOR THE PROJECT

Since no sampling occurred in 1994, and since community recovery had not occurred through the 1993 sampling, it is advisable to reexamine these eelgrass sites again in 1995 to monitor recovery.

PROJECT DESIGN

A. Objective

The objective is to monitor the natural recovery of the shallow (< 20 m) subtidal eelgrass community in Prince William Sound that was impacted by the EVOS by spatially comparing richness, diversity, abundance and biomass of dominant taxa between paired (oiled:control) sites.

B. Methods

Our approach for 1995 is to monitor the various successional stages of the eelgrass community toward stabilization by comparing components of oiled and unoiled sites in a stratified sampling design. We will again sample the sites that were sampled in 1990, 1991 and 1993. Sampling will be conducted at four oiled and control eelgrass sites. Methods will be the same as was previously used in this project. Within this habitat we will determine estimates of abundance/biomass of eelgrass, infauna, small epifauna attached to eelgrass, amphipods, large epifauna (i.e., crabs and sea stars), and juvenile Pacific cod. These estimates will be used to indicate the effects of the EVOS on this community by comparing abundance (and other parameters) at oiled vs. control sites.

C. Schedule

July 1995	Field activities are planned for two weeks during this time to correspond with previous samplings
Dec. 1995	Completion of laboratory processing of samples
Feb. 1996	Completion of draft final report

D. Technical Support

A research vessel is needed for two weeks of diver sampling. In addition, two skiffs will be needed to assist in the field operations. Inflatable boats (14 ft) with 30 hp outboards has functioned best in past field efforts. These should be provided by ADFG or the vessel subcontractor.

E. Location

A total of four oiled sites and four control sites have been selected from those we previously studied in western Prince William Sound. Sampling will occur at the following oil/control paired sites: Bay of Isles (O)/Drier Bay (C); Herring Bay (O)/Lower Herring Bay (C); and Sleepy Bay (O)/Moose Lips Bay (C); Clammy Bay (O)/ Puffin Bay (C).

PROJECT IMPLEMENTATION

This project has been implemented by ADFG for the past three years.

COORDINATION OF INTEGRATED RESEARCH EFFORT

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

FY 95 BUDGET ($K)

Personnel	6.0
Travel	0.0
Contractual	180.8
Commodities	0.0
Equipment	0.0
Subtotal	186.8
Gen. Admin.	13.6
Total	200.4

Sound Waste Management Plan

Project Number:	95115
Restoration Category:	General Restoration (new)
Proposed By:	Prince William Sound Economic Development Council
Lead Trustee Agency:	ADEC
Cost FY 95:	$352,200
Cost FY 96:	$66,500
Total Cost:	Unknown
Duration:	Unknown
Geographic Area:	Prince William Sound
Injured Resource/Service:	Intertidal and subtidal organisms, and other injured resources and services that are dependent upon clean marine waters

INTRODUCTION

The Sound Waste Management Plan (SWMP) is a comprehensive plan to identify and remove existing oily and other solid waste from the waste stream, of the oil-impacted communities of Prince William Sound. The plan will improve upon current waste management and join past efforts into a unified regional effort. The SWMP, will put into action an oily and solid waste management system that will operate in all Prince William Sound communities to eliminate the potential for further encroachment or damage to the local ecosystem.

Problem: Currently each community in Prince William Sound is out of compliance with federal regulations as it relates to permitting of waste sites. There are no regional goals for managing, reducing and handling of oily and solid waste. Because there is no plan, Prince William Sound is at a potential risk to further environmental harm. Prince William Sound Economic Development Council's regional Solid Waste Management Committee was formed, therefore, as a task force of the area's largest contributors of waste. This included both cities, villages,

industry, and hatchery representatives. They identified the following regional problems:

1. Costs to manage and handle oily and solid waste continue to rise and tap declining revenue resources.
2. Existing landfills have limited life spans.
3. There is no long term solution in sight.

Solution: A three phase approach is needed to: 1. identify 2. reduce the cost of handling oily and solid waste, and 3. implement an oily and solid waste management plan.

- Phase I will identify the options and most cost-effective means for handling and managing oily and solid waste in Prince William Sound. The PWSEDC regional committee will contract a firm to accomplish this phase;
- Phase II will handle all required ADEC/EPA permitting to implement a regional management project; and
- Phase III is the implementation of the SWMP that includes construction of the identified, chosen project i.e. regional landfill, regional incineration, etc.

It is important to note that as a regional project, local input and coordination is crucial to the long-term success of the SWMP project by creating local ownership. This proposal was developed and intended to be coordinated by PWSEDC's Solid Waste Management Committee in cooperation with ADEC.

The EVOS Trustee Council has funded a similar project, number 94417 entitled "waste oil disposal facilities." The SWMP broadens that project approach and greatly increases the effectiveness of enhancement and restoration efforts due to its regional coverage, local expertise and long term monitoring.

Funding for SWMP will allow an effective and necessary approach to enhancement, clean-up and collection of valuable data as it relates to oily and solid waste management in Prince William Sound in 1995. The SWMP will restore, enhance and promote long-term preservation of Prince William Sound from the effects of oily and solid waste. This document describes the plan of work to be undertaken during FY '95

NEED FOR THE PROJECT

To further enhance, improve the rate of natural recovery of, and reduce future events of marine pollution in Prince William Sound, the SWMP, is crucial. To ensure the protection and preservation of the Prince William Sound oil-impacted region, implementation of this plan is needed. Under EVOS Designated Wilderness Area objectives, "any restoration objective which aids recovery of injured resources, or prevents further injuries, will assist recovery of these areas." This is the SWMP focus.

The current primary waste stream for oily waste are local harbors. From boats, both domestic waste water (sewage) and oily waste are discharged directly into Prince William Sound. The secondary stream is smaller in direct amounts, but no less damaging to the oil-impacted environment. This includes leachates from community landfills that contribute to the total impact of waste to the local ecosystem. To add to this, all area landfills in Prince William Sound including both cities and villages are out of compliance with federal regulations. The SWMP is the only regional effort identified to date that could provide a solution to oily and solid waste management in Prince William Sound.

PROJECT DESIGN

A. Objectives

The development of the Sound Waste Management Plan (SWMP) originated with Prince William Sound Economic Development Council's regional Solid Waste Management Committee. The primary objectives include the development and implementation of a regional strategy to limit the exposure of hazardous waste material in oil-impacted communities in Prince William Sound. The SWMP will provide a design and recommend an oily and solid waste collection and disposal alternative and provide a plan for future management of oily and solid waste in Prince William Sound. The following outlines the objectives to be accomplished in FY '95:

1. Gather background information on the composition and rate of oily and solid waste generation in Prince William Sound

2. Analyze waste management processing and disposal alternatives and select the most appropriate solution for Prince William Sound

3. Address regulatory requirements

4. Establish public participation program to understand and address community concerns and needs

5. Analyze oily and solid waste reduction and recycling options

6. Evaluate sites for a new regional landfill

7. Develop cost estimates for oily and solid waste management alternatives

8. Recommend financial planning to fund oily and solid waste services

B. Methods

The SWMP will include a scoping of the current Prince William Sound situation by qualified firm. This scoping will determine both the options and costs related to each in implementing a regional oily and solid waste management system.

C. Schedule (FY 95 - Plan of Work)

Phase I	
Nov 1, 1994	Distribute Request for Proposals (RFP's) for regional oily and solid waste management plan.
Dec 1	Coordinating meeting (Review of submitted proposals)
Jan 1995	Select consulting firm and draft contract
Feb 1	Coordinating meeting (contractor and committee)
Mar 1	Review of scoping firm's draft plan findings with PWSEDC Solid Waste Committee comments.
Apr 1	Public Review of findings (held in each PWS community)
Apr 2	Determination of most efficient and cost effective regional oily and solid waste system.
Phase II	
Apr 1, 1995	Start process for implementation of regional oily and solid waste system.
Apr 15	Scope ADEC/EPA permitting for project implementation
Jun 1	Committee review and evaluation of FY 95 Work Plan.
July 15	Meeting to review draft ADEC/EPA permits
Aug 15	Submit ADEC/EPA permit
Oct 1	Meeting with ADEC/EPA about questions on permit
Nov 1	Submit revised permit
Jan 1996	Coordinating meeting
Phase III	
May 1	Initiate construction of permitted facility
Aug 1	Facility complete and operational

D. Technical Support

Prince William Sound Economic Development Council's Solid Waste Management Committee will play both an evaluative and advisory role to the scoping firm.

E. Location

Prince William Sound

PROJECT IMPLEMENTATION

To maintain the direct link from development and implementation of the SWMP, Prince William Sound Economic Development Council's regional Solid Waste Management Committee is the only appropriate entity to implement this regional project. Alaska Department of Environmental Conservation will additionally play an advisory, and coordinating role with the Committee's efforts.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The SWMP program is a coordinated effort of the Prince William Sound Economic Development Council in cooperation with: Department of Environmental Conservation, Alyeska Pipeline Service Company, Chugachmiut, Valdez Fisheries Development Association, Prince William Sound Aquaculture Corporation, Prince William Sound Conservation Alliance, the City of Valdez, the City of Whittier, the City of Cordova, and the Villages of Tatitlek and Chenega.

FY 95 BUDGET ($K)

Personnel	34.4
Travel	7.2
Contractual	285.3
Commodities	2.0
Equipment	0.0
Subtotal	328.9
Gen. Admin.	23.4
Total	352.2

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Harbor Seals and EVOS: Blubber and Lipids as Indices of Food Limitation

Project Number:	95117-BAA
Restoration Category:	Research (new)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	NOAA
Cost FY 95:	$94,400
Cost FY 96:	$74,500
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound and northern Gulf of Alaska
Injured Resource/Service:	Harbor seal

INTRODUCTION

This proposal is written in collaboration with the inter-disciplinary and integrative Marine Mammal Ecosystems program submission to EVOS. As outlined under the broad program direction, the goals of the combined collaborative projects are to investigate ecosystem wide questions addressing the recovery of marine mammal injured species, specifically, harbor seals. These issues include the direct impact of oil spills, human interactions, food, competition, climatic factors, disease and habitat loss.

Under these guidelines, the enclosed proposal deals with the issues of body condition and health status of harbor seals with the resulting data applying directly to issues of disease, food limitation and the impact of oil.

In collaboration with other field teams, 30-40 harbor seals will be captured and temporarily held at sampling sites within and outside the EVOS area. Complete body morphometrics (to assess body condition) and samples of blood (to examine disease/health status) will be collected. Seals will be returned unharmed to the capture site and blood samples will be taken to the University of Alaska in Fairbanks for analysis.

Body Morphometrics: Using a large temporal and geographic data base currently held at UAF, the body morphometrics of the harbor seals will be analyzed and fit to models of body condition. For example, we have excellent data relating the length and girth of seals to their

body mass. By fitting harbor seals to these curves, we can assess whether the animals are underweight (malnourished) or "normal". Additional factors, such as estimates of total body fat and body density, are included in these assessments of condition. It is proposed that by comparing values for body condition from harbor seals collected before and after the EVOS event and by comparing data collected from animals inside and outside of the EVOS area, we can provide information as to whether this species, which is not recovering, appears to be physically sound.

Blood Chemistry: Samples of blood will be analyzed for over 30 indicators of "health". These tests will examine, among others, potential anemia, dehydration, organ function, tissue damage and oxygen carrying capacity. In addition, assays for hormonal balance and stress protein levels that are extremely sensitive to alterations in health status will be conducted. These data will be compared, on a temporal basis with samples collected before EVOS and on a geographic basis with control animals that were not impacted.

NEED FOR THE PROJECT

As a component of the Marine Mammal Ecosystems proposal, this project deals with the health status/disease/body condition segment of harbor seal biology. To move towards the restoration of marine mammals, a multi-disciplinary, integrative approach is critical given the scope of the problem. Thus, certain components of the Marine Mammal Ecosystems group will focus on habitat use and trophic level interactions, others on population studies and others on food resources. Any one agency cannot handle all components of such an intense approach. The University can provide the services and research for the health component through the Institute of Marine Science marine mammal physiology group. To move towards restoration, interactive projects, such as the one proposed here, must be carried out in collaboration with monitoring programs. That is, limited field programs that only contained a monitoring component or conversely only looked at individual animals would not be the most appropriate way to understand the impact of the EVOS event on injured species.

The premises and hypotheses of this project are simple: Either the EVOS impacted animals are different in their health status compared to non-EVOS animals, or they are not. If the species are compromised, then we will know some of the directions that would have to be followed towards potential restoration. If they are not compromised, then we will be able to focus our attention into other areas that may better explain their current recovery status.

PROJECT DESIGN

A. Objectives

1. Capture 30-40 harbor seals at locations throughout PWS at two to three different times per year. This work will be in direct field collaboration with ADFG.

2. Hold animals for 1-4 hours during which time complete body measurements and blood samples will be collected.

3. Analyze body measurements via computer modeling and assay blood samples for health indicators.

B. Methods

Captures: This will involve procedures tested in the field and routinely utilized by ADFG. Basically, the seals are approached from sea on small boats while the animals are hauled out on beaches. A net is set across the beach and the animals move from the beach into water when they see the boats. Animals are caught in the nets, moved onto the beach, tranquilized to facilitate the measurements and held until all sampling, attachment of diving recorders and recovery from anaesthesia are completed.

Body measurements: Linear and curvilinear length, girth at seven locations and mass are collected from each animal. These are quickly and easily carried out in the field. Back at UAF, the data are fit into models of how length, girth and mass are related for harbor seals and animals are quickly placed above or below their predicted weight for size. In addition, estimates of total body fat will be collected from measurements of total body impedance (BIA). This method utilizes a quick assessment of body fat by measuring resistance across a set of electrodes placed at the head and tail of the body. Further estimates of body fat are taken from ultrasound measurements of blubber depth at half a dozen sites across the body. From all of these values, estimates of body density (ie, relative fatness) can be evaluated.

Blood chemistry: Blood samples are measured in the field to assess the number of red cells in the blood (hematocrit), visualized under microscopes to examine the types of blood cells and then prepared for return to the lab. At Fairbanks, the samples are sent to a veterinary laboratory for assessment of "standard" health indices (such as cholesterol level, salts, and enzymes characteristic of tissue damage) and also analyzed at UAF for indicators of dehydration (water content), malnutrition (BUN, ketones), stress (haptoglobin), hormone imbalance (Angiotensin, ANP) and stress proteins (samples sent to collaborators at Stanford Research Institute). These data can then be compared to cataloged values for healthy seals to assess the status of the PWS seals.

It should be emphasized that the above methods are routine for the marine mammal group at UAF and that we conduct similar assays hundreds of times/year on seal and sea lion species from around the world. Thus, we have the expertise, the data bases and the consistency to best analyze these samples from the PWS animals.

C. Schedule

Capture dates: It is anticipated that captures of harbor seals will occur in the spring (April), summer (July) and fall (October) for both calendar years 1995 and 1996.

Analysis dates: Blood samples will be analyzed after each capture. Some of the assays are rapid and can be done within days for all samples, others take much longer. Body morphometric analysis is rapid and animals can be quickly assessed.

Report dates: The last predicted field season will be in the fall of 1996 and the final section of support will be to allow completion of analyses and publish reports. A final report will be submitted on 12/31/97.

D. Technical Support

Veterinary samples will be sent on a service agreement to veterinary facilities in Fairbanks. Stress protein samples will be sent to Stanford Research Institute for analysis. All other analytical processes will be carried out by UAF personnel. Boat and direct field support will be through our ongoing collaboration with ADFG.

E. Location

Harbor seals will be captured in the EVOS event area in central and southwest PWS.

PROJECT IMPLEMENTATION/COORDINATION OF INTEGRATED RESEARCH EFFORT

As noted above, this project on the health of harbor seals, is submitted jointly as part of the Marine Mammal Ecosystems program. This component is being run by the marine mammal physiology group at UAF. Other state agencies, federal agencies and universities will be in charge of other components of the project. UAF, ADFG and NOAA currently collaborate with each other on marine mammal biology projects in and around Alaska. This project expands and builds on that collaboration and extends the depth of the project to focus on the EVOS event.

FY 95 BUDGET ($K)

Personnel	39.3
Travel	5.1
Contractual	7.7
Commodities	3.5
Equipment	12.3
Indirect Costs	20.1
Subtotal	88.0
Gen. Admin.	6.4
Total	94.4

Diet Composition, Reproductive Energetics, and Productivity of Seabirds Damaged by the *Exxon Valdez* Oil Spill

Project Number:	95118-BAA
Restoration Category:	Research (new)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	NOAA
Cost FY 95:	$140,600
Cost FY 96:	$144,100
Total Cost:	Unknown
Duration:	3 years (useful results can be obtained in two years, but to be effective the project should be supported for a minimum of three years)
Geographic Area:	Prince William Sound (Naked Island, Shoup Bay, Jackpot Island, Fool Island, Icy Bay, Blackstone Bay)
Injured Resource/Service:	Multiple resources

INTRODUCTION

Three seabird species that were damaged by the *Exxon Valdez* oil spill (EVOS) are failing to recover at an acceptable rate: pigeon guillemot (*Cepphus columba*), common murre (*Uria aalge*), and marbled murrelet (*Brachyramphus marmoratus*). Damage from the spill to a fourth species of seabird, black-legged kittiwake (*Rissa tridactyla*), is equivocal, but recent reproductive failures of kittiwakes within the spill area may be due to longer term ecosystem perturbation related to the spill). The status of pigeon guillemots and marbled murrelets in Prince William Sound (PWS) and the Northern Gulf of Alaska has been of concern for nearly a decade due to declines in numbers of adults observed on survey routes.

The failure of these seabirds to recover has been attributed to low reproductive success, but there is a troubling lack of information on the factors ultimately responsible for low productivity. One prevalent hypothesis is that changes in the abundance and species composition of forage fish resources within the spill area has resulted in food provisioning rates that are below the requirements of growing nestlings. Concurrent population declines in some

marine mammals, particularly harbor seals, have also been blamed on food limitations. Whether these changes in forage fish availability are related to or have been exacerbated by EVOS is unknown.

Reproductive success in seabirds is largely dependent on foraging constraints experienced by breeding adults. Previous studies on the reproductive energetics of seabirds have indicated that productivity is energy-limited, particularly during brood-rearing. Also, the young of most seabird species accumulate substantial fat stores prior to fledging, an energy reserve that is crucial for post-fledging survival. Data on foraging habitats, prey availability, and diet composition are critical for understanding the effects of changes in the distribution and abundance of forage fish resources on the productivity and dynamics of seabird populations.

The composition of forage fish is particularly relevant to reproductive success because it is the primary determinant of the energy density of chick diets. Parent seabirds that transport chick meals in their stomachs (e.g., kittiwakes) or in a specialized pouch (e.g., auklets) normally transport meals that are close to the maximum load. Seabirds that transport chick meals as single prey items held in the bill (e.g., guillemots, murres, murrelets) experience additional constraints on meal size if optimal-sized prey are not readily available. Consequently, seabird parents that provision their young with fish high in lipids are able to support faster growing chicks that fledge earlier and with larger fat reserves. This is because the energy density of lipid is approximately twice that of protein and carbohydrate. Also, forage fish are generally very low in carbohydrate, and metabolism of protein as an energy source requires the energetically expensive process of excreting the resultant nitrogenous waste. While breeding adults can afford to consume prey that are low quality (i.e., low in lipid) but abundant, reproductive success is largely dependent on provisioning young with high quality food items. If prey of adequate quality to support normal nestling growth and development are not available, nestlings either starve in the nest or prolong the nestling period and fledge with low fat reserves.

Forage fish vary considerably in lipid content, lipid:protein ratio, energy density, and nutritional quality. Much of the energy content of prey consumed by seabirds is in the form of neutral lipids, especially triglycerides and wax esters, and wax esters in particular are known to be difficult to digest. In some seabird prey, such as lanternfishes (*Myctophidae*), lipids may constitute as much as 50% of dry mass; while in other prey, such as juvenile walleye pollack (*Theragra chalcogramma*), lipids are less than 5% of dry mass. This means that a given mass of lanternfish has more than twice the energy content of the same mass of juvenile pollack. Published values for lipid content (% dry mass) of other forage fish are intermediate between those of lanternfish and juvenile pollack: herring (Clupeidae)- 36.7%, sandlance (Ammodytidae) - 24.4%, smelt (*Osmeridae*) - 15.8%, capelin (*Mallotus villosus*) - 15.3%). These studies have shown that for a particular species of forage fish, lipid content can vary widely with season, sex, reproductive status, and age class. For example, sandlance can vary from 10% lipid (% dry mass) to 31.5% lipid and gravid female capelin have nearly twice the energy density of male capelin. By increasing the proportion of high-lipid fish in chick diets, parents can increase the energy density of chick meals in order to compensate for the low frequency of chick feeding.

NEED FOR THE PROJECT

This study is relevant to EVOS Restoration Work because it is designed to develop a better understanding of how shifts in the diet of seabirds breeding in PWS affect reproductive success. Unlike marine mammals, seabirds offer the possibility of directly measuring diet composition and feeding rates, and their relation to productivity. By monitoring the composition and provisioning rates of seabird nestling diets, prey preferences can be assessed. Measuring provisioning rates is crucial because even very poor quality prey may constitute an acceptable diet if it can be supplied at a high rate. Understanding the diet composition, foraging niche, and energetic constraints on seabirds breeding within the spill area will be crucial for designing management initiatives to enhance productivity in species that are failing to recover from EVOS. If forage fish that are high in lipids are an essential resource for successful reproduction, then efforts can be focused on assessing stocks of preferred forage fish and the factors that impinge on the availability of these resources within foraging distance of breeding colonies in PWS. As long as the significance of diet composition is not understood, it will be difficult to interpret shifts in the utilization of forage fishes and develop a management plan for effective recovery of damaged species.

There is a definite need for information on the relationship between diet and reproductive success for pigeon guillemots, common murres, and marbled murrelets, all seabird species that are failing to recover from EVOS at an acceptable rate. However, the latter two species pose serious problems for studies of diet composition in the spill area. For common murres it is difficult to collect quantitative data on diet composition, feeding rate, meal size, and chick growth rates without seriously impacting productivity because this species nests in dense colonies on narrow ledges where human activity can cause high losses of eggs and chicks. Also, murre chicks leave the nest site to go to sea at only c. 21 days post-hatch, when they are only 20% of adult mass. In addition, the murre colonies most damaged by the spill and slowest to recover are located in the Barren Islands, where few nesting ledges are accessible. Marbled murrelet nests are usually located high in mature conifers and are very difficult to locate. Most nest visits by parents provisioning young occur at night, so monitoring chick diets is highly problematic. While some limited information on chick diets may be obtained as part of on-going EVOS studies of common murres in the Barren Islands and marbled murrelets breeding on Naked Island, neither of these species are feasible study subjects for assessing the role of diet composition for seabird reproductive success in the spill area.

Guillemots are the most neritic members of the marine bird family Alcidae (i.e., murres, puffins, and auks), and like the other members of the family, capture prey during pursuit-dives. Pigeon guillemots are a well-suited species for monitoring forage fish availability for several reasons: (1) they are a common and widespread seabird species breeding in Prince William Sound; (2) they primarily forage within 5 km of the nest site; (3) unlike most seabird species, they do not breed in large, dense colonies; (4) they raise their young almost entirely on fish; (5) they prey on a wide variety of fishes, including schooling forage fish (e.g., sandlance, herring, smelt) and subtidal/nearshore bottom fish (blennies, sculpins); (6) the one- or two-chick broods are fed in the nest until the young reach adult body size. In addition, there is strong evidence that most guillemot pairs breeding at Naked Island within the spill area have specialized on

schooling forage fish during the chick-rearing period, and that these pairs fail to raise young when forage fish are not available. Guillemots carry whole fish in their bills to the nest-site crevice to feed their young. Thus individual prey items can be identified, weighed, measured, and collected for composition analyses.

Black-legged kittiwakes also breed abundantly in the spill area and rely largely on forage fish during reproduction. Unlike guillemots, kittiwakes are efficient fliers, forage at considerable distances from the nest, and capture prey at or near the surface. Although kittiwakes are highly colonial, cliff-nesting seabirds, they construct nests and can be readily studied at the breeding colony without causing substantial egg loss and chick mortality. Several breeding colonies of black-legged kittiwakes in PWS are easily accessible so that chicks can be weighed regularly without resorting to technical climbing. Diets fed to kittiwake chicks in PWS consist primarily of schooling forage fish (i.e., sandlance, herring, juvenile walleye pollock), but when forage fish are scarce, euphausiids may be substituted. Like guillemots, kittiwakes can raise one- or two-chick broods, and chicks remain in the nest until nearly adult size. Together with pigeon guillemots, black-legged kittiwakes are excellent bioindicators of the distribution and abundance of preferred forage fish in PWS.

The proposed research is the first focused study to investigate the effects of diet composition on reproductive energetics and productivity of piscivorous seabirds in PWS. The research will result in a fundamental advance in our understanding of the significance of prey composition for pigeon guillemot and black-legged kittiwake reproduction, as well as for other seabirds and marine mammals that breed in PWS. The research will also provide new information relevant to several additional areas of study: (1) comparative biochemical composition and physiological condition of forage fishes, (2) factors such as age class, sex, size, and reproductive status as they influence the nutritional quality of forage fishes, (3) responses of breeding seabirds to shifts in prey availability, and (4) the energetic consequences of foraging on different prey with differing energy content. This research will be the first to (1) measure the nutritional quality of various forage fishes used by breeding seabirds in PWS, (2) use data on diet composition and provisioning rates to construct energetics models of chick growth and survival, and (3) monitor fat deposition rates of individual seabird chicks on differing dietary regimes by repeated, noninvasive analysis. In addition, the results will have broader implications for our understanding of dietary constraints on reproductive success in other piscivorous seabirds damaged by the spill (common murre, marbled murrelet) and will enhance our understanding of the adaptive significance of prey preferences in these seabirds. These results are crucial for understanding the factors constraining recovery of marine birds and mammals damaged by the spill.

PROJECT DESIGN

A. Objectives

The overall objective of the proposed research is to determine the energy content and nutritional value of various forage fishes used by seabirds breeding in the EVOS area, and to

relate differences in prey quality and availability to reproductive success and physiological condition of breeding adults. The proposed research will emphasize pigeon guillemots and black-legged kittiwakes for practical reasons, but prey composition and quality will be evaluated for common murres, marbled murrelets, and tufted puffins as data and samples permit. Specific objectives are enumerated below:

1. To determine the nutritional quality of various forage fish species consumed by seabirds in the EVOS area as a function of size, sex, age class, and reproductive status, including:
   a) lipid content
   b) water content
   c) ash-free lean dry matter (protein) content
   d) energy density (kJ/g fresh mass)
   e) lipid composition (triglyceride, wax ester, mono- and diglyceride, free fatty acid, phospholipid)

2. To determine dietary parameters of pigeon guillemot and black-legged kittiwake chicks in PWS, including:
   a) provisioning rate (meal size X delivery rate)
   b) taxonomic composition of the diet
   c) biochemical composition of the diet
   d) energy density of the diet

3. To determine the relationship between diet and the growth, development, and survival of seabird nestlings. Variables measured will include:
   a) growth rates of total body mass, lean body mass, and total body fat
   b) rates and patterns of flight feather development
   c) fledging age and fledgling body mass and fat reserves

4. To determine the contribution of specific forage fish resources to the overall productivity of seabird breeding pairs, including:
   a) body composition (physiological condition) of parents raising chicks
   a) gross foraging efficiency of parents
   b) conversion efficiency of food to biomass in chicks
   c) net production efficiency of the parent/offspring unit

B. Methods

The proposed research approach utilizes a combination of sample/data collection in the field (in conjunction with other EVOS seabird studies in PWS) and laboratory analyses. Sample collection and field data collection will be conducted concurrently during the 1995, 1996, and 1997 breeding seasons at three guillemot and three kittiwake colonies in PWS. Thirty active and accessible nests of each species will be located and marked during early incubation at each of the study colonies during the three breeding seasons. These nests will be closely-monitored until the young fledge or the nesting attempt fails.

Fresh samples of forage fishes for proximate analysis will be collected using three techniques: (1) temporarily placing "neckties" on guillemot chicks to prevent them from swallowing prey delivered by parents and retrieving samples from chicks, (2) temporarily placing screens in the entrance of puffin nest burrows and retrieving the chick meals left by adults, and (3) collections from at sea trawls conducted as part of proposed studies of the distribution and abundance of forage fish in PWS. Kittiwakes transport chick meals in the stomach, so chick diet samples will consist of semi-digested food. Kittiwake meal samples are normally collected when chicks regurgitate during routine weighing and measuring. Fresh fish samples and kittiwake regurgitations will be weighed (± 0.1 g) in the field and immediately frozen for shipment to my laboratory at University of Alaska Fairbanks, where they will be kept in an ultra-low freezer at -70° C until proximate analysis. In the lab, forage fish specimens will be reweighed (± 0.1 mg), identified to species, aged, sexed, measured, and reproductive status (gravid, recently spawned, nonreproductive) determined. Kittiwake regurgitations will be sorted into prey classes to the extent feasible, but otherwise handled as with fresh prey samples. Forage fish specimens will be dried to constant mass in a convection oven at 60° C to determine water content. Lipid content of a subsample of dried forage fish will be determined by solvent extraction using a soxhlet apparatus and petroleum ether as the solvent system. Lean dry fish samples will then be ashed in a muffle furnace at 500° C in order to calculate ash-free lean dry mass by subtraction. A subsample of dried forage fish samples will be combusted in a bomb calorimeter to determine energy density. Energy content of chick diets will be calculated from both the energy densities determined by bomb calorimetry and the composition (water, lipid, lipid-free dry matter, and ash) of forage fish along with published energy equivalents of these fractions.

The lipid composition of forage fish (percentage wax esters, triglycerides, mono- and diglycerides, free fatty acids, and phospholipids of total lipids) will be determined by extracting total lipids from a subsample of fresh-frozen forage fish using the Bligh and Dyer technique. Extracted lipids will then be separated into the various lipid classes and quantitated using TLC/FID analysis procedures. This procedure will allow us to determine the percentage of total lipids in forage fish that are in the form of wax esters and other refractory (hard to digest) lipid classes. My laboratory is equipped with all the instrumentation required for proximate analysis of samples, including a Soxtec HT-12 soxhlet apparatus; an Iatroscan TLC/FID system; and a Parr automated adiabatic bomb calorimeter.

Chick provisioning rates for pigeon guillemots and black-legged kittiwakes in PWS will be determined by monitoring active nests to determine meal delivery rates throughout the 24 h period. Average meal size, taxonomic and biochemical composition of the diet, and average energy density of chick meals will be determined as part of analyses of diet samples collected from guillemot and kittiwake chicks.

Known-age chicks will be weighed and measured regularly to determine individual growth rates throughout the nestling period. Total body fat of chicks at 20 and 30 days post-hatch will be determined by noninvasive (nondestructive) measurement of total body electrical conductivity. Fat reserves of chicks will be measured in the field using a total body electrical conductivity (TOBEC) fat analyzer (SA-3000 Small Animal Body Composition Analyzer from EM-SCAN, Inc., Springfield, IL. The TOBEC method relies on the major difference in conductivity

between lipids and other body constituents to estimate total lean body mass). The difference between total body mass, as determined by weighing, and lean body mass, estimated by TOBEC, provides an estimate of total body lipid. A major advantage of the technique is that measurements can be obtained rapidly and repeatedly without harm to the subject. Also, validation studies to date indicate that accuracy is high (r2 = .996). The SA-3000 TOBEC analyzer can be used in the field and powered from a 12 volt battery, so chicks can be measured for TOBEC and returned to their nest in a matter of minutes. Body mass, primary feather development, and total body fat measurements will be used to develop a condition index for each chick at 20 and 30 days post-hatch.

The effects of diet composition on the physiological condition of breeding adults will be monitored using a combination of direct and indirect methods. Attentiveness of adults will be monitored during the incubation period. Adults will be captured on the nest early in the chick-rearing period and body composition determined nondestructively by TOBEC analysis. Frequency of chick meal delivery and meal size will be determined during the chick-rearing period as part of diet composition studies.

Data on chick age-specific body mass, wing chord, and primary feather length will be separated by year and diet, and fit to Gompertz sigmoidal growth models. Growth constants (K), inflection points (I), and asymptotes (A) of fitted curves will be statistically analyzed for significant differences among years and diets. Lipid deposition rates from TOBEC analysis will be compared using slopes of least squares linear regression models. Gross foraging efficiency of adults will be calculated from daily energy expenditure by the following equation:

$$([M \cdot F \cdot D] + DEE) / DEE = GFE,$$

where M is average chick meal mass in grams, F is average frequency of meal delivery in meals day-1 parent-1, D is energy density of chick meals in kJ/gram, DEE is adult daily energy expenditure in kJ/day, and GFE is adult gross foraging efficiency in kJ consumed/kJ expended. Daily energy expenditures of pigeon guillemots, black-legged kittiwakes, and common murres have been measured previously using the doubly-labeled water technique and are available in the published literature. Net production efficiency of chicks as a function of age will be calculated by regressing the change in body mass over a 24 hour period against the mass of food consumed during the period, as determined by periodic weighing. Comparison of food conversion efficiency of chicks will provide an estimate of the relative energetic efficiency of diets composed of various forage fishes. The net production efficiency of the parent/offspring unit will be calculated for each diet and each year for both species using the equation:

$$CFCE / ([DEE \cdot 2] + [M \cdot F \cdot D]) = TNPE,$$

where CFCE is chick food conversion efficiency in grams of body mass gained per gram food ingested, TNPE is the total net production efficiency of the parent/offspring unit in grams gained by chicks per kJ of energy expended by both parents, and other variables are as described above.

C. Schedule

Field work in Prince William Sound will be conducted during the 1995, 1996, and 1997 breeding seasons. Data collection during three field seasons will be necessary in order to provide minimal information on interannual variation in diet composition and reproductive success. Guillemots and kittiwakes normally lay eggs from late May to late June and raise their young during July and early August. Active, accessible nests of the two study species will be located and marked early in the incubation period during late May and early June. Marked nests will be checked daily during the hatching period to determine hatching date, and chicks will be banded soon after hatching so that individual growth rates can be monitored throughout the nestling period. Samples of chick meals and measurements of chick feeding rates will be collected throughout the nestling period. Chicks will be monitored throughout the nestling period in order to determine growth rates, fledgling age and mass, and survival until fledging.

Following the field season, chick meals will be analyzed in the lab in order to determine the taxonomic and biochemical composition of guillemot and kittiwake diets and their relationship to chick growth and survival. These analyses will be completed before the next field season in order to determine the results prior to collecting additional samples from the field. A draft annual report will be prepared in April and a final report will be submitted in June.

Following the analysis of samples collected during the 1997 field season, data collected during the three field seasons will be analyzed for relationships between diet composition and reproductive success by May 1998. The results of these analyses of diet composition and its relation to productivity and chick growth will be prepared in manuscript form and submitted by the end of FY 1998.

D. Technical Support

Laboratory analyses of the biochemical composition and energy content of forage fishes will be conducted in the laboratory of the PI. No analyses will be subcontracted to other laboratories. No new laboratory equipment will need to be purchased for the proposed research with funds provided by the grant. A laboratory technician will be hired to help the PI and graduate research assistant with processing chick meals and diet samples, and with performing of routine laboratory analyses.

E. Location

The proposed field work will be conducted in PWS. PWS supports accessible breeding population of guillemots and kittiwakes that are more than adequate for the proposed research. Field work on guillemots will be conducted at breeding colonies on Naked Island, Fool Island, and Jackpot Island. Approximately 800 pigeon guillemots nest along the shores of Naked Island, as well as smaller number of marbled murrelets and tufted puffins. The Naked Island base camp would offer an ideal base for field studies on guillemots), and Naked Island supports the highest breeding densities of guillemots in PWS). Fool Island has approximately 80 guillemot nests and Jackpot Island has about 60 guillemot nests and pairs are breeding at high

densities in both sites.

Field work on kittiwakes in PWS will be conducted at breeding colonies at Shoup Bay, Icy Bay, and Blackstone Bay. Approximately 400 black-legged kittiwakes nest at the Shoup Bay colony, 1,100 at Icy Bay, and 2,000 at Blackstone Bay.

The at-sea foraging distribution of pigeon guillemots near Naked Island, Fool Island, and Jackpot Island has been the subject of previous study, as has the species composition of the diet. Kittiwake foraging distribution and reproductive success has been monitored at the Shoup Bay colony for several years. A field camp operated by the U.S. Fish and Wildlife Service is available for field workers on Naked Island and Shoup Bay and is within walking distance of colonies where adequate numbers of accessible guillemot and kittiwake nests are available.

PROJECT IMPLEMENTATION

The proposed research will be implemented by the University of Alaska Fairbanks, with assistance from and in cooperation with U.S. Fish and Wildlife Service biologists with expertise on the proposed study species in the proposed study area. The PI (Daniel D. Roby) has extensive experience with studies of the reproductive energetics of high latitude seabirds and the relationship between diet composition and productivity. The PI currently has in his laboratory the analytical equipment necessary to accomplish the proposed laboratory analyses and is familiar with the relevant analytical procedures. To the PI's knowledge, the expertise and equipment necessary for the proposed research are not available within the federal and state agencies that compose the Trustees Council. The PI will be assisted by a Graduate Research Assistant (Ph.D. candidate), Field Technician, and undergraduate field assistant who will be carefully selected from the applicant pool as qualified to participate in the proposed research.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The research described in this proposal dove-tails nicely with on-going research to assess factors limiting recovery of seabird and marine mammal populations damaged by EVOS . It is also relevant to efforts toward developing seabird models as upper trophic level sentinels of changes in the availability of forage fish, such as sandlance, juvenile pollack, herring, capelin, and smelt. The proposed research approach utilizes prey composition, reproduction rates, and energetics models to help identify and quantify the present level of forage fish availability within the PWS ecosystem. This approach is necessary because evaluation of the stocks of various forage fishes is extremely complex due to temporal and spatial variability and unpredictability in the distribution of forage fish in PWS.

Studies of foraging, reproduction, and population recovery following the EVOS are on-going for pigeon guillemots, common murres, and marbled murrelets. Black-legged kittiwakes are currently being used as indicators of ecosystem function and health within PWS. This proposal

complements those studies without duplication of effort. The PI on the present proposal will work closely with Drs. David Irons, Kathy Kuletz, and David Roseneau to coordinate data collection in the field so as to minimize project cost and maximize data acquisition.

Cooperators include Dr. David Irons of the Migratory Bird Branch, U.S. Fish and Wildlife Service. Dr. Irons has had extensive experience working in the field with both guillemots and kittiwakes nesting in PWS, and is project leader for on-going studies of the reproductive success and status of these two species in PWS. Close coordination with Dr. Irons' research teams at Naked Island and Shoup Bay will be essential for the success of the proposed research.
In order to understand dietary factors responsible for poor reproductive performance of seabirds in PWS, it will be important to conduct simultaneous shipboard work (hydroacoustics) to assess the distribution and abundance of forage fish at sea. That research was recently funded by the Trustees Council and will be invaluable for interpretation of data on diets collected as part of the present proposal.

FY 95 BUDGET ($K)

Personnel	45.7
Travel	4.7
Contractual	24.6
Commodities	17.8
Equipment	0.0
Indirect Costs	39.2
Subtotal	132.0
Gen. Admin.	8.6
Total	140.6

Proximate Composition and Energetic Context of Selected Forage Fish Species in Prince William Sound

Project Number:	95120-BAA
Restoration Category:	Research (new)
Proposed By:	Physiological Ecology Research Laboratory, Marine Mammal Research Program, Texas A&M University
Lead Trustee Agency:	NOAA
Cost FY 95:	$43,000
Cost FY 96:	$35,000
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

As a result of damage assessment studies initiated after the *T/V Exxon Valdez* struck Bligh Reef in March, 1989, it was noted that several pelagic-feeding marine mammal and sea bird species found in Prince William Sound, AK were apparently not recovering back to predisturbance population levels. This lack of recovery may be due to a number of factors, including possible food limitations. Food limitations have been suggested to be a problem for a variety of species which are found throughout the Bering Sea and Gulf of Alaska. While cause-effect relationships are difficult to demonstrate, changes in the energetic value of prey species can be quantified and these values used in the interpretation of energy availability to the impacted species. In Prince William Sound, two marine mammal species, harbor seals *(Phoca vitulina)* and sea otters *(Enhydra lutris),* and several sea bird species: common murre (*curia aalge*), harlequin duck *(Histrionicus histrionicus),* marbled murrelet *(Brachyramphus marmoratus),* and pigeon guillemot (*Cepphus Columba*) have been impacted and are not recovering. Others, such as killer whales (*Orcinus orca*), are recovering but may be indirectly inhibiting the recovery of other species if food competition is a problem.

There is increasing interest in the use of energetic models to study interactions between marine mammals or sea birds and their prey species. Often these models are based upon energy transfer between predator and prey. Although these models require information on the energy

content or proximate composition of these species, few data are available. Those data which have been published have limited application due to the inherent seasonal and annual variability in the value of the prey. The goal of this proposed research is to assess on a seasonal and annual basis, the value of the major prey species which would be of significance to the mammalian and avian predators listed above. These data will allow for the development of models which may yield reasons for the lack of recovery of these species.

NEED FOR THE PROJECT

This study will provide the background data necessary for future studies of food web dynamics and ecology of many species of fish, birds and mammals of Prince William Sound. In any long term study of foraging ecology, especially those investigating the recovery of impacted species, knowledge of prey species composition and energetic value is critical in the interpretation of consumption rates and therefore the impact of consumer species upon prey species stocks. Compositional analysis will also yield important information on the general quality of the environment by assessing the condition of important prey species.

PROJECT DESIGN

A. Objectives

The objectives of this study are to assess the seasonal and annual changes in the proximate composition of the major forage fish species in Prince William Sound. Data on the composition and energetic value of prey species for marine mammals and sea birds are very limited. Most data which are available are for commercial species which are consumed by humans. These data are further limited, in their ecological application, because they usually only analyze the edible fillets which people consume. Another major limitation in the database relates to the lack of an appreciation of the magnitude of seasonal variability which occurs. For example, herring (*Clupea harengus*) can vary from as little as 3% lipid to as much as 22% lipid seasonally. Knowing the energy content and composition of these species will allow us to further enhance our understanding of the energetic and physiological ecology of the major consumer species in the Sound.

B. Methods

Species which should be collected are listed in Table 1. Samples should be frozen immediately after collection and be representative of the size classes which are known to be consumed by the consumer species in question.

All analytical techniques are described in detail in Worthy and Lavigne (1983) and Hislop et al. (1991). Analysis will be performed on freeze-dried, ground fish and will include determinations of water content, total lipid content, total protein content, ash content and energy density. Initially, wet mass, sex and length of each individual specimen will be recorded. Specimens

would then be combined, ground and homogenized prior to freeze-drying. Water content will be determined gravimetrically by lyophilization of ground homogenized prey until constant mass has been obtained. This will be accomplished using a LabConco Lyophilizer over a period of 4-5 days. Once the samples are dried, they are finely ground using a Spex 8000 Mixer/mill. This ground material will be used in all subsequent analyses and will be available for other investigators to use for future studies.

Lipid content will be measure gravimetrically by Soxhlet extraction using petroleum ether as the solvent. Protein content will be assessed using a modified Kjeldahl analysis and ash content will be determined by ashing at 550°C for 2 h in an ashing oven. Ground lyophilized samples will be analyzed for energy content by means of a Parr adiabatic bomb calorimeter.

C. Schedule

It is suggested that sampling be conducted a minimum of two seasons per year, when maximum productivity is occurring. If samples can be opportunistically obtained on a more regular basis, then a more detailed assessment of seasonal changes can be undertaken.

D. Technical Support

Collections will be done during NMFS and ADFG cruises, charter cruises, and through the purchase of fish from local fishermen. All of the required equipment and expertise for this project are on-site at Texas A&M University - Galveston. This includes all of the specialized equipment required for the composition and energetics analysis, as well as archival capabilities for samples and the computer related software for full statistical analysis of the data.

E. Location

Collections will take place throughout Prince William Sound and surrounding waters.

PROJECT IMPLEMENTATION

This proposal is being submitted by the Physiological Ecology Research Laboratory (PERL) of the Marine Mammal Research Program (MMRP) of Texas A&M University - Galveston. The PERL is already collaborating with National Marine Fisheries Service, National Marine Mammal Laboratory, on two other projects related to the ecology of killer whales and use of stable isotope tracers in Prince William Sound. All of the data obtained in the present study will also be incorporated into the Integrative Marine Mammal Ecosystem Program.

The PERL has 20 years of combined experience in the analysis of prey species of marine mammals for their composition and energetic value. The ultimate aim of the PERL is to develop a library of prey species samples which could be made available to researchers for future analyses, as well as to make available data on long-term changes in prey species energetic values. The PERL currently is involved in similar projects in California, Texas, Florida and eastern Canada.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Collection of prey species will be undertaken by NMFS as well as other agencies operating in Prince William Sound. Additionally dedicated cruises may be required for the collection of certain species. Samples will be archived for potential future use by other investigators interested in this area.

FY 95 BUDGET ($K)

Personnel	20.5
Travel	3.0
Contractual	0.0
Commodities	3.5
Equipment	1.0
Indirect Costs	11.9
Subtotal	39.9
Gen. Admin.	3.1
Total	43.0

Table 1

Table 1 lists forage fish species of significance in the Prince William Sound System, which are proposed to be studied for composition and energetic value in the present study. Suggested species were determined by assessing their importance to the various sea birds and marine mammals which are found in Prince William Sound. Some species are of importance only to the larger species such as killer whales *(Orcinus orca).*

Pacific herring *Clupea harengus pallasi*
Rockfish *Sebastes sp.*
Cutthroat trout *Salmo clarkii*
Capelin *Mallotus villosus*
Rainbow smelt *Osmerus mordax*
Sand lance *Ammodytes hexapterus*
Eulachon *Thaleichthys pacificus*
Pacific cod *Gadus macrocephalus*
Walleye pollock *Theragra chalcogramma*
Sablefish *Anopoploma ftmbria*
Pacific sandfish *Trichodon trichodon*
Pink salmon *Onchorhynchus gorbuscha*
Sockeye salmon *O. nerka*
King salmon *O. tshawytscha*
Silver salmon *O. kisutch*
Chum salmon *O. iceta*

Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish Species in PWS

Project Number:	95121
Restoration Category:	Research (new)
Proposed By:	Physiological Ecology Research Laboratory Marine Mammal Research Program Texas A&M University-Galveston
Lead Trustee Agency:	NOAA
Cost FY 95:	$48,100
Cost FY 96:	$11,500
Total Cost:	$59,600
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

Food web dynamics is a central topic of ecology and fisheries and wildlife management. Evaluating the flow of energy between predator and prey is an important process in marine ecosystem dynamics. Until recently, stomach content analysis of dead animals and scat analysis provided the only sources of information on the diet of marine mammals and fish. Although widely used, these techniques have several limitations in both their methodology and results. Such limitations of these techniques provide the initiative to explore alternative methods of determining diets. Although its origins are in geology and geochemistry, the use of naturally occurring carbon and nitrogen stable isotopes have recently come forth as a powerful tool to trace ecosystem dynamics and predator prey relationships.

Previous studies on marine mammals, birds, and fish using carbon and nitrogen stable isotope tracers have shown that the isotopic composition of a prey is reflected in the tissues of the predator. The trophic level of the predator is also reflected based on its diet. Trophic level refers to the number of successive transfers of energy from resource to consumer. This technique uses differences in the ratios of carbon ($^{13}C/^{12}C$) and nitrogen ($^{15}N/^{14}N$) to trace diet

through carbon and nitrogen pathways. The carbon isotope ratio $^{13}C/^{12}C$ indicates the source of the diet whereas the nitrogen isotope ratio $^{15}N/^{14}N$ reflects the trophic level of the animal.

An advantage over traditional stomach content analysis is that the ratios of the stable carbon and nitrogen isotopes reflect the actual prey items that assimilate into the predator's tissues over time, providing a more accurate indication of their dietary history. The time course of the dietary history of an animal determined using stable isotope tracers and various tissues will depend upon the turnover rates of the tissue examined. Since individual tissue turnover rates vary based on their metabolism, analyses of stable isotopes of different tissues from the predator can provide information on the relative time frame of prey consumption. This approach with various fish tissues will depend upon the growth rate of the fish species. Slow growing fish may take years for a change in the isotopic ratio to occur in a tissue, whereas the isotope ratio in a fast growing fish may show up sooner.

If the predator consumes multiple foods, isotope values can indicate, but not prove, that a certain type of food was ingested. However, isotope tracers can sometimes prove when a food item was not consumed and assimilated. Recently, an additional method has been proposed for understanding marine food webs, even determining prey items and diet of marine mammals, through the use of fatty acid signatures. In overview, fatty acids are essentially the building blocks of lipids. Organisms are able to biosynthesize and modify fatty acids, but are subjected to biochemical limitations and differences in these processes depending on the phylogenetic group or even species. Specific fatty acids cannot be synthesized by animals, noted as essential fatty acids, and therefore can only originate from the diet. Lipids from marine organisms are characterized by an exceptionally complex array of fatty acids and substantial differences in fatty acid composition exist among species and prey types, as well as within species by geographical regions. In carnivores and marine mammals, dietary fatty acids are often deposited in body tissue without modification and therefore it is possible to trace fatty acids obtained from the diet and to compare arrays in the tissues of the predator to those in the prey consumed.

In addition to fatty acid patterns, fatty acids may sometimes be used as individual tracers. For instance, a study by Hooper *et al.* (1973) indicated that jellyfish were a component of the diet of sunfish *(Mola Mola)* on the basis of a single unusual fatty acid which was initially found in leather back turtles *(Dermochelys coriacea coriacea)* whose diet is exclusively jellyfish. The combination of using stable isotope tracers and fatty acid signatures will trace food webs beyond to what is presently possible with existing methods.

However, biological markers can also have multiple sources resulting in ambiguous results. The use of stable isotopes or fatty acids may not fully decipher the diet of an animal on their own. The use of a third approach could interpret such data whose resolution is not well defined for successful analysis. This new approach in food web analysis will be the analysis of the isotopic ratio of the fatty acids themselves. This will provide a higher resolution that may differentiate isotopic ratios and fatty acid signatures that are similar. Investigations suggest that the stable isotope compositions of discrete molecular structures more accurately reflect their origin and history than either isotopic composition or structure alone. The higher cost of this analysis preclude the use on a routine basis and will be used to interpret in situation where the results

of tracers and signatures are similar.

The strength of the combination of these three methodologies will be the ability to define and identify individual stocks of prey that are being consumed by marine mammals, fish and birds. This would provide valuable data on marine mammal-fishery, bird-fishery interactions and for fisheries management of the specific fish stocks (herring, cod, salmon) that marine mammals and birds may be impacting.

Since predators are not 100% efficient in assimilating all of the biomass ingested, the energy available to the predator from prey must be determined. This will be accomplished by using bomb calorimetry and compositional analysis to determine caloric values. This project will initiate and complement a full study of fish energetics being submitted separately.

NEED FOR THE PROJECT

This study will provide the background data necessary for future studies of food web dynamics and ecology of food resources used by many species (whales, seals, birds and fish) within Prince William Sound. With increasing pressure on our natural resources, especially fisheries, new techniques of life history interpretation and science are needed. The combination of tracer techniques will greatly enhance the knowledge available on the physiological ecology of predator-prey relationships with the Sound.

PROJECT DESIGN

The objectives of this study are to provide baseline diet, energy, and trophic level data of fish species which are prey of marine mammals and birds in Prince William Sound. Knowing the stable isotope ratios, fatty acid signatures, and caloric values of prey fish will further enhance our understanding of the food web structure of Prince William Sound and provide comparative results with stomach analysis.

It is suggested that sampling be conducted a minimum of two seasons when maximum productivity is occurring. Fish species to be sampled would be those that are known prey of marine mammals, sea birds, and large fish species. These would include capelin *(Mallotus villosus),* herring *(Clupea harengus pallasi),* sand lance *(Ammodytes hexapterus),* pollock *(Pollachius virens)* surf smelt *(Hypomesus pretlosus),* squid *(Gonatopsis maldca, Berryteuthis magisfer),* salmon *(Oncorhynchus sp.),* as well as macrozooplankton and euphausiids. Twelve samples from each species per sampling area would be collected. Samples will be stored frozen and shipped to Texas A&M for processing and analysis. A brief synopsis of the analytical techniques follows.

Isotope Analysis:
Carbon and nitrogen occur naturally in two stable forms. Lighter forms l2C and "N are more abundant than the heavier isotopes ^{13}C and ^{15}N. The common vernacular is to refer to the heavier isotope concentrations as a ratio in d notation in part per thousand noted (ppt) as determined from:

$$dX = [(R_{sample/} R_{standard}) - 1] \times 1{,}000$$

where X is ^{13}C or ^{15}N and R is the corresponding ratio $^{13}C/^{12}C$ or $^{15}N/^{14}N$. For this study, stable isotope values will be measured using a carbon-nitrogen isotope ratio gas mass spectrometer. The stable isotope value of a predator is directly related to its diet as follows:

$$d_{tissue} = d_{diet} + \Delta_{dt}$$

where Δ represents the isotopic fractionation factor between dietary and consumer tissue. Carbon isotope ratios are similar for marine systems typically differing between prey protein and consumer protein by + 1ppt), while nitrogen isotope ratios differ between dietary protein and consumer tissue by 3-4ppt.

Fatty acid Analysis:
Tissue samples will be extracted in 2:1 Chloroform/methanol (volume/volume) with 0.01% BHT (weight/volume) by the Folch method as modified by Iverson. Fatty acid methyl esters will be prepared directly from aliquots of the chloroform extract by the addition of borontriflouride in methanol, sealing under nitrogen, and heating at 100°C for one hour. Following transesterification, methyl esters will be extracted and purified in hexane.

Analyses of fatty acid methyl esters will be performed according to Iverson *et al.* using temperature programmed capillary gas liquid chromatography on a Perkin Elmer Autosystem II Capillary FID Chromatograph fitted with a 30m x 0.25 mm i.d. column (J&W DB-23) and linked to a computerized integration system (Turbochrom 4 software). Identifications of fatty acids and isomers will be determined from known standard mixtures (Nu Check Prep., Elysian, MN) and silver-nitrate chromatography. Fatty acids will be designated by shorthand IUPAC nomenclature of carbon chain length:number of double bonds and location (n-x) of the double bond nearest the terminal methyl group.

Fatty acid data will be analyzed using a multivariate statistic method (tree-based regression models) which has been successfully applied to the analysis of these types of data.

Stable isotope-fatty acid analysis: A gas chromatograph-isotope mass spectrometer will be used to analyze the stable isotope ratios of individual fatty acid molecules. This instrument performs stable carbon isotope analyses of individual compounds separated by gas-chrornatography. This technique of using a gas chromatograph-isotope ratio mass spectrometer combines the separatory power of capillary gas chromatography with the precision of a mass spectrometer.

PROJECT IMPLEMENTATION

This proposal is being submitted by the Physiological Ecology Research Laboratory (PERL) of the Marine Mammal Research Program at Texas A&M University-Galveston. The uniqueness and strength of this proposal is the association of PERL with the stable isotope labs at Texas A&M University-College Station, and the fatty acid lab at Dalhousie University, Halifax that will be combining to analyze the samples. Data collected would be available to other agencies involved in restoration projects.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Collection of prey species will be undertaken by NMFS. Sample analysis will be multifaceted within Texas A&M University Depts. of Marine Biology, Oceanography, and Rangeland Ecology and Management and Dalhousie University, Halifax, Nova Scotia Dept. of Biology.

FY 95 BUDGET ($K)

Personnel	17.3
Travel	4.0
Contractual	9.1
Commodities	1.5
Equipment	0.0
Subtotal	44.9
Gen. Admin.	3.2
Total	48.1

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Habitat Protection and Acquisition Support

Project Number:	95126
Restoration Category:	Habitat Protection (continuation of 94126)
Proposed By:	Habitat Work Group
Lead Trustee Agency:	ADNR
Cooperating Agencies:	ADFG, DOI, USFS
Cost FY 95:	$1,099,500
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	Ongoing
Geographic Area:	Prince William Sound, Kenai Peninsula, Alaska Peninsula, and Kodiak Archipelago
Injured Resource/Service:	Multiple resources

INTRODUCTION

This project is designed to support habitat protection activities of the Trustee Council and is a continuation of the Comprehensive Habitat Protection Process. These activities include evaluations by the Habitat Work Group (HWG), appraisals, title searches, hazardous materials surveys and other efforts necessary for the Trustee Council to achieve habitat protection objectives. In 1993 the Restoration Team, Habitat Protection Work Group conducted a survey and assessment of selected large parcels of private land (>1000 acres) within the oil spill zone. The lands were mapped, scored and ranked to determine the restoration value of these areas to injured resources and services and the benefits that could be achieved through habitat protection. Successful negotiations were conducted with owners of lands within Kachemak Bay State Park and on northern Afognak Island resulting in the purchase of the park inholdings and in the establishment of the Afognak Island State Park.

During 1994, technical support continues to be provided to the Executive Director, negotiators and appraisers engaged in negotiations with landowners. Parcel boundaries were refined by HWG in order to capture the key habitats within the smallest possible land area. Packages of ranked parcels, selected either by the negotiators or by HWG, as logical negotiation units, were evaluated and ranked. The results were provided to the negotiators and to the Executive

Director. Secondary evaluations were conducted on acquisition proposals wherein less than fee simple interests were negotiated. Additional large parcels were identified for site surveys, evaluation and ranking which will take place during the summer field season. Presentation materials including numerous maps were produced and used by the Executive Director and negotiators in presentations to the Trustee Council and the public.

In 1994, a method was developed for nominating, processing, evaluating and ranking parcels of private land less than 1000 acres, i.e., *The Small Parcel Process*. Responses to the solicitation for nominations of small parcels are currently being processed and evaluated.

NEED FOR THE PROJECT

The objective of habitat protection is to identify and protect essential wildlife and fisheries habitats and associated services and to prevent further environmental damage to resources injured by the *Exxon Valdez* oil spill. Nineteen resources and services injured by the spill are linked to protection of upland and nearshore habitats (See Project Design). Protection of lands containing these habitats prevents additional injury to resources and services and natural support systems while recovery is taking place. Active negotiations with landowners for packages of ranked parcels are currently taking place and anticipated to continue into the Fall. Evaluations, starting with field surveys, of large and small parcels submitted this Spring will also continue into the Fall. This project provides support for HWG to provide technical support to the negotiators and the Executive Director and to conduct these additional evaluations.

PROJECT DESIGN

A. Objectives

Habitat protection and acquisition is designed to protect lands linked to resources and services that were injured by the *Exxon Valdez* oil spill. Protection of these lands prevents additional injury to living resources and habitats, services and natural support systems while recovery is taking place. Habitat protection addresses cases where existing regulations affecting private land use are inadequate to protect essential habitats of recovering resources and services.

In situations where natural recovery is slow to occur or where direct restoration is neither technically feasible or cost effective, other measures need to be considered to mitigate injury. These may include replacement of injured resources and services with those that are equivalent The affected injured resources and associated services are listed below. Habitat protection objectives and benefits for each of these resources and services would differ depending on the particular parcel and the options acquired, however, general objectives and benefits are outlined below.

1. Pink salmon, sockeye salmon, cutthroat trout, Dolly varden, herring: ensure maintenance of adequate water quality, riparian habitat and intertidal habitat for spawning and rearing.

2. Bald eagle: ensure maintenance of adequate nesting habitat and reduce disturbance in feeding and roosting areas.

3. Black oystercatcher: reduce disturbance to feeding and nesting sites.

4. Common murre: reduce disturbance in nearshore feeding areas and near nesting colonies.

5. Harbor seal and sea otters: reduce disturbance at haul-out sites, pupping sites, and in nearshore feeding areas.

6. Harlequin duck: ensure maintenance of adequate riparian habitat for nesting and brood rearing, and reduce disturbance to nearshore feeding, molting, and brood-rearing habitats.

7. Intertidal/subtidal biota: maintain water quality along shoreline and reduce disturbance in nearshore areas.

8. Marbled murrelet: ensure maintenance of adequate nesting habitat and reduce disturbance to nearshore feeding and broodrearing habitats.

9. River otter: ensure maintenance of adequate riparian and shoreline habitats for feeding and denning.

10. Recreation: Maintain or enhance public access for recreational opportunities, reduce disturbances that would create visual impacts.

11. Wilderness: Maintain wilderness qualities, reduce impacts to wilderness qualities.

13. Cultural resources: Maintain or reduce disturbance to cultural resource sites.

14. Subsistence: Ensure subsistence opportunities in known harvest areas.

B. Methods

The *Habitat Protection and Acquisition Process* is the method for acquiring lands or partial interests in lands that contain habitats linked to resources and/or services injured by the oil spill. Protection tools that will be considered for use by the Trustee Council include: fee acquisition, conservation easements, acquisition of partial interests, cooperative management agreements, and others. Following purchase, acquired parcels will be managed by the appropriate resource agency in a manner that is consistent with the restoration of the affected

resources and/or services. The Trustee Council will decide which agency will manage the land or may create a new management authority.

Funds from this project will be used to acquire full title or partial interests in lands, subject to approval by the Trustee Council, that contain habitats/sites linked to resources and services that were injured by the *Exxon Valdez* oil spill. Acquisition of lands or interests in lands will be accomplished according to accepted realty principles and practices. All acquisitions will require title evidence, appraisals of fair market value, litigation reports, hazardous substances surveys, legal review of title, and negotiations. Some acquisitions may require land surveys and additional ecological and mineral surveys.

This project provides for these services and any other additional services which may be necessary to enable the Trustee Council to close final purchase agreements for habitat protection on parcels under negotiation. These services may be secured either in house or contractually depending upon agency regulations and staffing requirements.

The HWG will provide support to negotiators by conducting secondary evaluations and providing primary evaluations for any newly identified parcels which the Trustee Council may wish to consider. Evaluation formats developed by the group will be used, taking into account existing data and data obtained by HWG in 1993 and 1994. Data gaps will be filled to the maximum extent possible and practicable. GIS work will be needed to sort, manage, and analyze data and to map resource information where appropriate and in response to negotiator requests.

Site reconnaissance visits and post-acquisition management surveys will be determined on a site specific basis. Travel will be via air and boat charters.

C. Schedule

Support for negotiations and appraisals, for both large and small parcels, is dependent upon the progress of negotiations with landowners and the needs of the negotiators. Negotiations are currently taking place with large parcel landowners. Evaluation and ranking of small parcels will occur during this summer and fall. It is anticipated that negotiations for small parcels will commence in January, 1995. Field surveys of recently nominated large parcels will occur this summer.

D. Technical Support

The Habitat Work Group will provide technical support to agencies during their negotiations for large and small parcels. Alaska Department of Natural Resources and the appropriate federal agencies will provide support for title searches, appraisals, and hazardous substances surveys. Maps will be produced by HWG staff and by ADNR/LRIS.

E. Location

The analysis will cover all selected lands within the oil spill zone. Lands are located within Prince William Sound, Kenai Peninsula, Kodiak/Afognak Archipelago and on the Alaska Peninsula.

PROJECT IMPLEMENTATION

The proposed project is a continuation of 94126, habitat protection projects that were started in 1992 by the Restoration Planning Work Group and outlined in concept in Volume I of the *Restoration Framework*. Implementation of this project would be by the negotiating agencies and the Habitat Work Group. This group includes four members representing ADNR, USFS, ADFG and USFWS. The HWG includes three individuals who have been working on the spill since early 1989 and who participated in the genesis and development of habitat protection as a restoration strategy. All four members are authors of the *Comprehensive Habitat Protection Process* report and participated in the development of the *Small Parcel Process*.

The multicriteria evaluation methods used in *Imminent Threat Process*, the *Large Parcel Element* and the *Small Parcel Element* of the *Comprehensive Habitat Protection Process* utilize explicit subjective values and judgments made by a group of biologists/resource managers. This collective best professional judgment can vary as a function of the subjective weights applied by different individuals. Consequently, in order to maintain a consistent collective bias in these continuing evaluations, the same team should continue the effort.

It is appropriate that ADNR continue their technical support for mapping and GIS because of their demonstrated expertise, familiarity with the project and project participants and the in-house collection of relevant digital databases.

COORDINATION OF INTEGRATED RESEARCH EFFORT

All habitat protection efforts including this project are dependent upon the results of on-going research and monitoring projects. For example, the Large Parcel Element used information from the anadromous fish stream catalog, colonial seabird catalog, bald eagle nesting maps, and data from Trustee Council funded studies on black oystercatchers, marbled murrelets and pigeon guillemots.

FY 95 BUDGET ($K)

Personnel	363.5
Travel	51.8
Contractual	572.1
Commodities	16.2
Equipment	3.0
Subtotal	1006.6
Gen. Admin.	92.9
Total	1099.5

Nanwalek/Port Graham/Tatitlek Clam Restoration Project

Project Number:	95131
Restoration Category:	General Restoration (new)
Proposed By:	Nanwalek and Port Graham Village Councils
Lead Trustee Agency:	ADFG
Cost FY 95:	$445,000
Cost FY 96:	$528,600
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Port Graham/Nanwalek and Tatitlek areas
Injured Resource/Service:	Subsistence and clams

INTRODUCTION

This project will develop the technology to and begin to reestablish local clam populations for subsistence use in the Nanwalek/Port Graham area and in the Tatitlek area. Clams were once a major subsistence food in these communities, but the local clam populations have decreased to very low levels in recent years and their contribution to the subsistence harvest has been greatly reduced.

There are probably several reasons why local clam populations are currently at low levels. These include changes in current patterns and beach configurations resulting from the 1964 earthquake, increasingly heavy sea otter predation and the *Exxon Valdez* oil spill.

The oil spill impacted the wild clam populations and their importance as a subsistence food in two ways. First, many clam beds suffered from direct oiling. The impact of the oil on the clam beds in Windy Bay, for instance, destroyed one of the most productive clam beds in the lower Kenai Peninsula. Second, even though some shellfish weren't killed from the oil, they have a tendency to accumulate, concentrate and store the toxic contaminants from non-lethal amounts of oil. This has badly eroded the confidence in the villages in the healthfulness of the remaining wild clam populations as a subsistence food.

One of the main problems with clam enhancement in Alaska has been the availability of a sufficient supply of seedstock. The Qutekcak Native Tribe of Seward is developing a shellfish hatchery that is currently focusing on providing Pacific oyster seed for the Alaskan aquatic farming industry. The hatchery has also been working to develop the technology for producing clam seedstock and is currently working on the Littleneck clam. This clam has never before been produced in a hatchery. However, the hatchery staff has been able to bring small batches of Littleneck clams through the most critical stage of development and it seems certain that the techniques for successfully producing Littleneck clam seedstock in the hatchery can be developed. In addition to Littleneck clams the hatchery will soon will doing seedstock development work on Butter clams. A major part of this project will be enabling the Qutekcak hatchery to provide the needed quantities of seedstock for developing populations of clams near the Native villages.

NEED FOR THE PROJECT

This project will provide the villages of Nanwalek, Port Graham and Tatitlek with an easily accessible source of clams for subsistence use. These clams will also be afforded some measure of protection against sea otter predation. With the wild clam populations at a low ebb, the questionable safety as a food source of those that remain in addition to the heavy sea otter predation that these clams are now subjected to, the need to develop safe, protected sources of clams for the villages is greater than ever. If this project is successful it will enable the villages to develop their own supplies of this traditional subsistence food.

PROJECT DESIGN

A. Objectives

1. Develop the techniques and the capacity in the Qutekcak hatchery for producing sufficient quantities of various sized clam seed.

2. Obtain the required permits for conducting the field work

3. Determine the survival and duration of culture to harvest size for different sizes of seed.

4. Determine the growth rates and survival in different types of substrate.

5. Determine the efficacy of various types of passive predator control measures such as fabric covers, bird netting and rack and bag culture.

B. Schedule

The hatchery work will run year round. The field season for testing the various culture scenarios will run from late April to the end of October. Reports will be done quarterly with the annual report issued in January.

C. Technical Support

Technical assistance will be needed in the hatchery operations, in setting up field trials and in testing clams for contamination.

D. Location

The Qutekcak shellfish hatchery is in Seward. Field work will take place in the Port Graham/Nanwalek area and in the Tatitlek area.

PROJECT IMPLEMENTATION

This project will be implemented by project teams selected and controlled by the village councils.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Technical assistance and services will be obtained from private contractors, the Chugach Regional Resources Commission (CRRC), the Alaska Department of Fish & Game (ADFG), the Alaska Department of Natural Resources (DNR) and the Alaska Department of Environmental Conservation (DEC).

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	415.9
Commodities	0.0
Equipment	0.0
Subtotal	423.1
Gen. Admin.	21.9
Total	445.0

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Port Graham and Nanwalek Subsistence Baseline

Project Number:	95132
Restoration Category:	General Restoration (new)
Proposed By:	Port Graham and Nanwalek Village Councils
Lead Trustee Agency:	ADFG
Cost FY 95:	$518,700
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2 years
Geographic Area:	Lower Kenai Peninsula from Port Graham Bay to Port Dick
Injured Resource/Service:	Subsistence

INTRODUCTION

This project proposes a subsistence foods testing program to establish baseline data on all subsistence salmon fishing and shellfish gathering areas used by the people of Port Graham and Nanwalek.

NEED FOR THE PROJECT

Many of the areas used by residents of Port Graham and Nanwalek were impacted by oil as a result of the *Exxon Valdez* oil spill. Even now (summer 1994), tarballs continue to wash up on these harvest areas. The continued presence of oil has caused residents of these communities to be wary of using resources, especially shellfish, from their traditional harvest areas. While some samples of subsistence foods from the harvest areas of Port Graham and Nanwalek have been tested for the presence of hydrocarbons under studies conducted by the Oil Spill Health Task Force, the Division of Subsistence of the Alaska Department of Fish and Game, the National Oceanic and Atmospheric Administration, and Exxon, funds were limited and only a few sites or species could be tested. Residents of these communities want a more comprehensive survey and testing of resources from their harvest areas.

This project would give the people of Port Graham and Nanwalek very specific information on what subsistence foods are safe to eat, and the location of subsistence foods that continue to be contaminated. It would also provide information that can be used as a baseline for comparison in the event of another oil spill reaching these areas.

PROJECT DESIGN

A. Objectives

To provide very specific, detailed, and comprehensive information to the residents of Port Graham and Nanwalek on the safety of subsistence resources in their traditional harvest areas. A second, subsidiary goal is to establish a baseline of hydrocarbon exposure for comparison in the event of another oil spill.

B. Methods

Samples of clams, chitons, snails, mussels, cockles, whelks, octopus and all species of salmon will be collected, where they occur, in ten bays from Port Graham Bay to Port Dick on the lower Kenai Peninsula. Three locations will be tested in each bay. Four samples of each shellfish species to be tested should be collected at each location. Eight individuals of each species of salmon to be tested should be sampled at each location. Bile and flesh samples will be taken from each salmon, to allow for bile metabolite screening.

A biological consultant will be contracted to oversee the collection of samples. The biological consultant will provide sampling supplies. Trained field assistants are locally available in each community. There will also be a local project leader who will supervise local hiring, monitor the performance of the biological consultant, and communicate results of the testing back to the communities.

The samples will be tested for hydrocarbon contamination. In order to provide consistency with earlier testing, the samples should ideally be tested at the National Marine Fisheries Service laboratory in Seattle.

C. Schedule

Samples will be collected during low tide cycles throughout the spring of 1995 and 1996.

D. Technical Support

It will be necessary to contract with a biological consultant to oversee the collection of samples and apply for the necessary scientific collection permits. The services of a biological laboratory specializing in hydrocarbon bioassay will also be required. Ideally, the samples should be tested at the NMFS laboratory in Seattle, to provide consistency with earlier studies. Additional technical support in setting up the project may be provided by the Alaska Department of Fish

and Game, Division of Subsistence. The Oil Spill Health Task Force and the Expert Toxicological Committee may provide assistance in the interpretation of test results.

E. Location

The project will be conducted on the lower Kenai Peninsula from Port Graham Bay to Port Dick, including the communities of Port Graham and Nanwalek. Testing of samples may be carried out in Seattle.

PROJECT IMPLEMENTATION

The project should be implemented by the Village Councils of Port Graham and Nanwalek.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is part of the Subsistence Restoration Planning and Implementation Project (94428), and would further the goal of restoring subsistence services damaged by the EVOS. It would carry on work done under the Subsistence Foods Testing Project (93017 and 94279), to help restore the confidence of subsistence users in their ability to determine the safety of their traditional wild foods. The project would also help to establish a baseline of hydrocarbon exposure of shellfish and salmon in this area for comparison in the event of another oil spill.

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	488.2
Commodities	0.0
Equipment	0.0
Subtotal	495.4
Gen. Admin.	23.3
Total	518.7

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English Bay River Sockeye Salmon Subsistence Project

Project Number:	95133
Restoration Category:	General Restoration (new)
Proposed By:	Nanwalek Traditional Council
Lead Agency:	ADFG
Cost FY 95:	$147,200
Cost FY 96:	$143,100
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	English Bay Lake system
Injured Resource/Service:	Sockeye salmon and subsistence

INTRODUCTION

This project will assist in the effort to build the English Bay sockeye salmon run back to historic levels. The sockeye salmon return to the English Bay River near the villages of Nanwalek and Port Graham was once a primary source of subsistence and cash for the villagers. Over the past 12 years or so the returns have dropped steadily from the 30,000 range to the current 5,000 range. This has resulted in a complete closure of both the subsistence and the commercial fishery.

The EVOS clean-up effort had a negative impact on the English Bay sockeye. Boom deployment during the early phases of the clean-up trapped a large number of outmigrating sockeye smolt in the boom curtain on the ebbing tides causing high levels of mortality. This, plus the loss of other subsistence resources in the area by the spill and the basic health concern that the villagers have with eating fish and marine plants from the spill area, has put emphasis on the need to build the English Bay sockeye return back up to a level that will support heavy subsistence use and a revived commercial fishery.

Studies were undertaken in 1990 by the Chugach Regional Resources Commission (CRRC) in cooperation with ADFG to determine the best approach to increasing the English Bay sockeye return. It was determined that smolt production in the system was the bottleneck to increasing the returns. A smolt production pilot project was initiated in 1991 employing lake pen rearing techniques to rear English Bay sockeye fry produced in a hatchery to presmolt in net pens and releasing into the system in the late fall for outmigration the following spring. The program proved successful and has been upgraded and expanded.

The program is proving to be a cost effective method of increasing the return to the English Bay River system. It is designed to be self-sustaining beyond the development stage. If successful over the long run it will provide a safe, reliable and badly needed supply of salmon to meet the area's subsistence and economic needs. However, additional funds are needed to sustain this enhancement effort. Additional funding is being requested under this project to ensure that the total program will continue through the development stage.

NEED FOR THE PROJECT

This project will provide the villages of Nanwalek and Port Graham with the means to increase the local sockeye run. In the past this run has been a vital part of the economic and social fabric of these communities. With the safety and availability of other fisheries resources in the area in doubt, the need to restore and enhance this sockeye run is more important than ever. This resource has the potential of providing these villages with a safe and reliable supply of a traditional subsistence food.

PROJECT DESIGN

A. Objectives

1. In 1995, 1996 and 1997 take 1.2 million English Bay sockeye eggs each year for incubation at the Port Graham Hatchery.

2. Transfer the resultant fry from the Port Graham hatchery to net pens in the English Bay lakes for rearing to at least eight grams and release into the system just before freeze-up.

3. Count the number of smolt leaving the system each year and the number of adults entering it. Collect pertinent information from any tagged fish.

4. Do an acoustic survey of the English Bay system, after the annual smolt outmigration is over, to determine the biomass of hold-over smolt.

C. Schedule

The field season runs from April to the end of November each year. The smolt out-migration takes place from early May through June; the pen rearing operation runs from early June to just before freeze-up; the eggtake occurs in August and the acoustical survey is done in late July. Reports are done quarterly with the annual report issued in January.

D. Technical Support

Technical assistance is needed in fish culture, tags analysis and the acoustical surveys.

E. Location

The English Bay Lake system.

PROJECT IMPLEMENTATION

This project will be implemented by the Nanwalek Sockeye Development Team, an arm of the Nanwalek Traditional Council.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Technical assistance and services are being provided by the Chugach Regional Resources Commission (CRRC) and the Alaska Department of Fish & Game (ADFG).

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	129.8
Commodities	0.0
Equipment	0.0
Subtotal	137.0
Gen. Admin.	10.2
Total	147.2

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Prince William Sound Salmon Stock Identification and Monitoring Studies

Project Number:	95137
Restoration Category:	General Restoration (continuation of 94137)
Proposed By:	ADFG
Cost FY 95:	$277,500 (includes $55,800 for data analysis and report writing of FY 94 work)
Cost FY 96:	$278,200
Total Cost:	$555,700
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Sockeye salmon and commercial fishing

INTRODUCTION

Recent annual production of wild salmon in Prince William Sound (PWS) has included from 800 to 900 thousand chum salmon (*Oncorhynchus keta*) and 300 to 500 thousand sockeye salmon (*Oncorhynchus nerka*). As with pink salmon, up to 75% of wild chum salmon spawn in intertidal areas. Oil from the *Exxon Valdez* Oil Spill (EVOS) was deposited in intertidal spawning areas for pink and chum salmon. Injuries from this contamination are well documented for pink salmon in PWS including direct lethal effects on embryos in the gravel and chronic reproductive impairment in subsequent generations exposed to oil. In addition, emergent fry and smolt of all salmon species from throughout PWS migrated through and reared in areas contaminated by oil. Willette and Carpenter (1993) demonstrated reduced growth and survival for pink salmon which reared in oiled portions of the Sound in 1989.

Chum salmon and sockeye salmon have life history similarities to pink salmon which may have also made them susceptible to injury from the EVOS. Chum salmon have both embryonic and early marine life history similarities and occur in many of the same streams as pink salmon. Sockeye salmon do not share intertidal natal habitat with pink salmon but they do spend portions of their early marine life history in areas of the Sound which were oiled. Given that both chum and sockeye salmon coexist with pink salmon during portions of the life history when EVOS related injuries occurred in the latter, it seems likely that sockeye and chum salmon were similarly injured.

Salmon stocks impacted by the EVOS are heavily exploited in commercial, sport, and subsistence fisheries. Many of these populations have been depressed in recent years and some, such as the Coghill Lake sockeye salmon population, are the subject of extensive EVOS Trustee Council restoration efforts. These restoration efforts are presently targeted at improving the productivity of the lake nursery area for juvenile sockeye salmon and cannot succeed without simultaneous efforts to improve management of the commercial fishery. The damaged populations exist in fisheries dominated by hatchery populations. The management of this mixed stock fishery has historically been based on maintaining good temporal and spatial distribution of spawning escapement for groups of wild populations (stocks) originating from eight major fishing districts and its success has relied upon the manager's ability to control stock specific exploitation rates. Restoration premised on such a management strategy will require accurate in-season catch stock composition estimates if lower harvest rates are to be achieved for damaged wild stocks.

The foundations for this project were firmly established in feasibility studies which were conducted beginning in 1986 and extending through 1988. During the damage assessment process large scale tagging and recovery projects were instituted and perfected by Natural Resources Damage Assessment (NRDA) Fish/Shellfish (F/S) Study #3. Damage assessment funds were expended for tagging hatchery releases of sockeye, coho and chinook salmon in 1989 and 1990 and releases of chum salmon in 1990. Tag recovery efforts for wild and hatchery salmon were funded by damage assessment funds in 1989, 1990, and 1991 and by restoration funds in 1993.

NEED FOR THE PROJECT

Although the extent of EVOS related injury to populations of sockeye and chum salmon in PWS is unknown, populations of wild pink salmon in PWS injured by the EVOS continue to experience poor reproductive success. Because they have life history similarities and overlap geographically with pink salmon it is likely that populations of chum and sockeye salmon were similarly injured. Populations of wild chum salmon in the northern portions of PWS are in serious decline as is the population of sockeye salmon in Coghill Lake in northern PWS. These populations must be protected from other sources of injury or mortality which could further jeopardize their ability to reproduce in adequate numbers for long term sustained yield.

Adult returns from injured wild populations mingle with other wild and hatchery populations in PWS waters and all are heavily exploited by commercial fisheries. Successful restoration of injured populations will require that they be exploited at a lower rate in these fisheries until their reproductive rates return to historic average levels. Minimizing the exploitation of injured wild populations will insure that sufficient numbers of adults enter streams to spawn for sustained yield. This project provides fisheries managers with real time estimates of the numbers of wild and hatchery fish in commercial harvests. These estimates enable managers to identify areas where exploitation of wild populations can be minimized while permitting the timely harvest of economically important hatchery returns.

PROJECT DESIGN

This project is designed to provide estimates of hatchery and wild fish contributions to commercial and cost recovery fisheries in Prince William Sound. These estimates will allow fisheries managers to monitor the size and health of wild salmon populations and lessen interceptions of wild fish in mixed stock fisheries. The project will be administered and supervised by the Alaska Department of Fish and Game.

A. Objectives

1. Make inseason estimates of the temporal and spatial contributions of tagged hatchery stocks of sockeye, chum, chinook and coho salmon to PWS commercial and hatchery harvests based on the number of tags detected in adipose clipped fish which are recovered during catch sampling;

2. Provide timely inseason estimates of hatchery and wild stock contributions to harvests by time and area to fisheries managers so they can closely regulate exploitation of injured wild stocks;

3. Use data from fully decoded tags recovered from commercial catches, cost recovery harvests, and hatchery brood stock to verify or adjust inseason contribution estimates and;

4. Estimate marine survival rates for each uniquely coded hatchery release group where possible.

B. Methods

Tag recoveries will be made from a stratified random sample. Fisheries will be stratified by district, discrete time segments and processor. For each stratum, 25% of the sockeye, chum, chinook and coho salmon commercial harvest and cost recovery harvest will be scanned for fish with a missing adipose fin. Catch sampling will be conducted in processing plants located in Cordova, Valdez, Anchorage and Whittier. Broodstock sampling will also occur at three PWS hatcheries. A minimum of 50% of the daily broodstock requirements at each hatchery will be scanned for fish with missing adipose fins.

In the catch, cost recovery and broodstock samples, the total number of fish scanned and the total number of fish with missing adipose fins will be recorded. The heads of fish with missing adipose fins will be removed, labelled and shipped to the Tag Lab in Juneau for tag removal and decoding. Tag recovery, scanning, and catch data will be merged in a computer data base and returned to Cordova for analysis.

C. Schedule

May 15 - Sept 30, 1995	Tag recoveries in commercial fisheries, cost recovery harvests, and brood stocks. Inseason catch stock composition estimates by time and area for management of commercial and cost recovery fisheries.
November 30, 1995	Draft summary report
January 15, 1996	Final Report

D. Technical Support

ADFG will supply biometrics support to ensure that project methods and data analyses will provide inseason stock contribution estimates at levels of accuracy and precision required for management of wild stocks in PWS.

E. Location

Sampling of salmon catches from commercial and cost recovery fisheries will occur in shore based processing plants in Cordova, Valdez, Whittier, and Anchorage. There will also be sampling in Seward, Kenai, and aboard floating processors if significant numbers of Prince William Sound salmon are processed at those locations. Extraction and decoding of tags will be accomplished by the ADFG coded wire tag lab in Juneau. All data analyses will be completed in Cordova with assistance from Anchorage based Alaska Department of Fish and Game biometrics staff.

PROJECT IMPLEMENTATION

This project is applied research which has direct and immediate applications to ADFG's statutory obligation to manage fisheries. Feasibility studies for the massive coded wire tagging and recovery operations required to manage PWS pink salmon were conducted by ADFG and the local, private aquaculture associations for two years prior to the EVOS. Concurrently, these agencies developed the methods described for the other species in this project, they have the infra-structure (e.g. the ADFG coded wire tag laboratory) in place for large scale tagging and tag recovery operations, and they are the logical choice for conducting this project.

The project is proposed as a cooperative effort to be funded by the Trustee Council, ADFG, and PWS aquaculture associations. Prince William Sound Aquaculture Corporation (PWSAC) and Valdez Fisheries Development Association (VFDA) spend approximately $50K annually to apply tags to sockeye and chum salmon. ADFG provides tagging equipment and technical expertise for tagging quality control. The Trustee Council will provide the funds for tag recovery in the commercial and cost recovery fisheries and in the hatchery brood stocks.

Overall project design, supervision, coordination, data analyses, and reporting will be the responsibility of Principal Investigator Sam Sharr, the ADFG Fisheries Biologist III Salmon Research Project Leader in Prince William Sound. Carol Peckham, an ADFG Salmon Research Biologist II in Cordova will act as the Project Leader, will supervise all the day to day project activities, complete inseason analyses for the ADFG Fisheries Biologist III Area Management Biologist and, take the lead on all post season analyses and reporting. The Principal Investigator and the Project Leader will receive approval of project design and quality control procedures, review of all data analyses, and editorial support for project reports from an ADFG Biometrician I based in the ADFG Anchorage Regional Office. The ADFG Principal Investigator together with the local and regional ADFG management staff are responsible for integration of information from this project into their inseason fisheries management decisions.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The monitoring, research and restoration objectives of this project are integral to the success of ecosystem research and restoration efforts described in the Sound Ecosystem Assessment (SEA) plan. It is an integral part of a package of proposed projects including the SEA (95320), the Salmon Otolith Marking (95320C), and the Pink Salmon Egg and Alevin Mortality (95191) projects. This project monitors the total returns and survival rates of wild salmon populations which are known to be in decline and that may have experienced oil related injury similar to that demonstrated for pink salmon. Information from this project will be critical to the maintenance and restoration of populations which are exploited directly and indirectly in mixed stock salmon fisheries. This project provides survival estimates for individual release groups from PWS hatcheries. These estimates are critical to several components of SEA including those investigating:

1. The dependence of salmon survival on sea surface temperature and other oceanographic features of PWS during the fry and juvenile life stages.

2. The dependence of salmon survival on abundance, size, growth rate, and distribution of fry and juveniles and, zooplankton population distribution, abundance, and species composition.

3. The dependence of salmon survival on abundance, size, growth rate, and distribution of fry and juveniles and the abundance distribution, size, and species composition of predator populations.

This project is also directly linked to the proposed Otolith Marking project. Otolith marking is a logical extension of marking technology which will ultimately replace many of the functions of coded wire tags and provide more accurate and precise estimates of hatchery and wild contributions to salmon catches and escapements in PWS at less expense. However, until otolith marks can be applied, coded wire tagging and recovery projects will continue to provide those estimates.

This project will integrate tender fleet tracking, processor plant logistics, and crew scheduling with existing ADFG salmon port sampling projects. Local aquaculture associations which apply tags provide all tagging, fry release, sales harvest, and brood stock data necessary for data analysis. Aquaculture associations also provide room, board, and logistics support for brood stock samplers at their hatcheries. Air charter and boat transportation required to get samplers to remote locations in PWS will be shared with other projects having similar needs.

FY 95 BUDGET ($K)

Personnel	208.8
Travel	8.6
Contractual	20.4
Commodities	7.0
Equipment	0.0
Subtotal	244.8
Gen. Admin.	32.7
Total	277.5

Elders/Youth Conference on Subsistence and the Oil Spill

Project Number:	95138
Restoration Category:	General Restoration (new)
Proposed By:	ADFG
Cost FY 95:	$85,800
Cost FY 96:	$0
Total Cost:	$85,800
Duration:	1 year
Geographic Area:	Prince William Sound, Lower Cook Inlet, Kodiak Island Borough, Alaska Peninsula
Injured Resource/Service:	Subsistence

INTRODUCTION

The goal of this project is to promote the recovery of subsistence uses of natural resources of the oil spill area through a conference that would involve elders, youth, and other representatives of spill area communities. Conference goals would focus on identifying the common experiences of communities and the subsistence skills which have been affected and need to be strengthened. The role of traditional knowledge in informing people about the spill's effects would be explored. An additional goal would be to discuss experiences with past crises and identify ways to prepare for the future. Through a contract, a facilitator would be responsible for organizing the conference, including designing an agenda and a structure for the conference. The conference would be videotaped. Conference proceedings would be published and a video produced. Both of these products would serve as educational tools to further the recovery of subsistence uses through the reintegration of subsistence uses, knowledge, and values into community life.

NEED FOR THE PROJECT

Subsistence uses of natural resources are essential to the economies and ways of life of communities of the oil spill area. After the spill, these uses were severely disrupted due to natural resource injuries and concerns about the safety of using subsistence foods that may have been contaminated by oil. Because of these reduced subsistence uses, opportunities to teach subsistence skills and traditional knowledge have also been diminished. As noted in the draft

Oil Spill Restoration Plan, "the more time users spend away from subsistence activities, the less likely they will return to it" (p 32). The restoration strategy for subsistence, as presented in the draft plan (pp. 32-33), has four parts, including an objective "to accelerate recovery of subsistence resources and services." One means to achieve this goal is "through increasing availability, reliability, or quality of subsistence resources, or increasing the confidence of subsistence users."

Increasing the confidence of subsistence users may be achieved by a gathering of knowledgeable individuals (including elders) and young people in order to identify the issues and problems raised by the spill and the means to address these issues. The conference would draw upon traditional knowledge and the experience of community residents in facing past crises. It could result in a list of subsistence skills that need re-invigorating in light of the disruptions since the oil spill. Another goal would be to share observations about natural resources in the spill area and recommend activities that could assist people in understanding the present conditions of these resources. Also, the conference could identify ways for communities to use their collective traditional knowledge and experiences to prepare for future environmental disasters. There has been no similar opportunity for the communities of the spill area which depend upon the natural resources for subsistence to discuss their common experiences, concerns, and plans as proposed for this conference.

The Draft *Exxon Valdez* Oil Spill Restoration Plan (p. 33) states that, regarding subsistence, "one indication that recovery has occurred is when the cultural values provided by gathering, preparing, and sharing food are reintegrated into community life" (p. 33). The conference will contribute to this goal through the discussion and dissemination of traditional knowledge about subsistence uses and about the common experiences shared by subsistence users since the spill. Additionally, this project will assist with the restoration of subsistence through monitoring of the recovery of subsistence uses. The information discussed at the conference will provide a picture of the present status of subsistence, which may in turn be used to direct future restoration actions.

PROJECT DESIGN

A. Objectives

Objectives include a conference with participation by representatives of communities of the oil spill area, written conference proceedings, and a video.

B. Methods

A professional services contract will be awarded to design the conference agenda and serve as the conference moderator. The contractor will consult with spill area communities as appropriate to set the agenda. The contractor will also be responsible for preparing the conference proceedings. A separate contract will be awarded to video tape the conference and produce a video presentation of the conference (see below).

Among the potential topics for discussion are:

1. What has been the common experience of subsistence users of spill-area communities since the oil spill? What has been lost? What has been gained? Are there differences between regions?

2. What actions need to be taken by communities to re-invigorate subsistence uses?

3. Are there subsistence skills which need to be emphasized? How can this be accomplished?

4. Is there traditional knowledge available to inform subsistence users about the spill's effects on natural resources and the safety of subsistence foods?

5. How have people of the spill area dealt with disasters in the past? What can we learn from those experiences?

6. Given what we have learned, how can communities prepare for the possibility of future disasters and threats to subsistence?

The conference will be video-taped and audio-taped. A proceedings volume will be prepared. A one to two hour video will also be produced to present the conference highlights and recommendations. It is intended that the proceedings and video be used as educational tools to promote an exchange of information and to strengthen subsistence traditions that have been weakened since the spill.

The conference would last one or two days. Each community of the spill area (approximately 20 communities) would nominate one elder, two students (high school or college aged), and one additional representative. The exact format for the conference would need to be determined by the contractor after consultation with the communities. It would likely entail several formats, including but not limited to formal presentations, panel discussions, round tables, and question/answer periods.

C. Schedule

October 1, 1994	Project approval
October 1994	Develop contract guidelines, evaluate bids, award contract
November - January 1995	Conference planning
February 1995	Conference
March - June	Production of conference proceedings and videos
July - August	Distribution of materials
September 1995	Complete project final report

D. Technical Support

None required

E. Location

The proposed conference will take place in Anchorage, primarily because of its centralized location. If feasible in terms of cost and facilities, an alternative location can be considered.

PROJECT IMPLEMENTATION

The Division of Subsistence of the Alaska Department of Fish and Game could coordinate the implementation of this project. This would entail preparing contract proposals for competitive bids, evaluating proposals, and monitoring the performance of the contractors. The division would also handle the logistics of the conference, including meeting facilities and participants' travel and accommodations. An alternative is to contract these coordination functions to a regional organization or coalition of communities with appropriate administrative resources. In either case, professional services contracts (or subcontracts) would be awarded to design the conference, prepare the proceedings, video tape the conference, and produce an informational video which summarizes the conference findings.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Information about the status of injured natural resources can be integrated into the conference. Conference findings, including observations by subsistence harvesters of natural resource populations, will be available for use by other researchers. Other proposed subsistence restoration projects also have public information components that will benefit from the information which is shared through the conference and its resultant products.

FY 95 BUDGET ($K)

Personnel	16.3
Travel	44.4
Contractual	21.0
Commodities	0.2
Equipment	0.0
Subtotal	81.9
Gen. Admin.	3.9
Total	85.8

Proposed Spawning Channel Port Dick Creek, Lower Cook Inlet

Project Number:	95139A
Restoration Category:	General Restoration (continuation of 94139)
Proposed By:	ADFG
Cost FY 95:	$33,200
Cost FY 96:	$144,500
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	West Arm Port Dick, Southern Kenai Peninsula, Lower Cook Inlet
Injured Resource/Service:	Pink salmon and commercial fishing

INTRODUCTION

This project will construct a pink and chum salmon spawning channel at Port Dick Creek to accelerate and restore the salmon stocks and services lost to the local commercial salmon seine fleet. This project is a proposed continuation of two prior years pre-construction investigations.

NEED FOR THE PROJECT

To accelerate the recovery of the currently depressed wild pink and chum salmon stocks of Port Dick Creek by increasing the area available to salmon spawners.

PROJECT DESIGN

A. Objectives

The major goal of this project is the final engineering analysis during the fall of 1994 and actual

construction of the spawning channel during the summer of 1995. The objectives and completion dates are proposed as follows:

1. Continue ground water level measurements, data analysis, final engineering design and bid preparation during the winter of 1994/95.

2. Construct the spawning channel during the spring/summer of 1995.

3. Conduct stream side egg-takes with native salmon stocks and replant the eggs into the new spawning channel at the eyed stage in 1995.

4. Monitor subsequent egg/fry survival through on site evaluations beginning in the spring of 1996 through 1998.

5. Monitor adult spawner density and species composition beginning in the summer of 1998 through 1989.

B. Methods

Continued ground water level measurements will be conducted using subsurface standpipes and a battery operated stream stage recorder. Results from these measurements will be used to finalize the size, depth and actual configuration of the spawning channel. The final spawning channel design will be prepared by a qualified engineer. The design will be advertised through the official state construction bid process.

The actual construction project will be awarded to the lowest qualified bidder. Construction of the spawning channel will be conducted with appropriate heavy equipment such as D9 Caterpillar tractors. Only on-site gravel materials will be used. Mobilization and demobilization of heavy equipment and logistical support materials will be conducted using a 110 ft. landing craft vessel.

Standard fish culture methods will be used to conduct on-site Port Dick Creek chum salmon egg-takes. Instream incubation systems will be used for incubation to the eyed egg stage. Eyed egg planting devices will be used to seed the spawning channel during the first few years to increase the probability of success. Several sample plots or enclosures will be identified for subsequent evaluation.

Sample plots or enclosures will be evaluated to determine overwinter survival from the eyed egg to emergent fry stage. These will be monitored during the spring pre-emergent and emergent phase.

Periodic stream surveys will be conducted during the spawning runs to determine adult spawner density and species composition. Stream life studies will also be conducted concurrent with this adult portion of the evaluation project.

C. Schedule

See "Objectives" above.

D. Technical Support

Technical support will come from Department of Natural Resources, Department of Fish and Game, and Dryden Instrumentation (environmental engineers).

E. Location

The project site is located in the West Arm of Port Dick, Southern Kenai Peninsula, Lower Cook Inlet.

PROJECT IMPLEMENTATION

The Alaska Department of Fish and Game will implement the project. A bid will be awarded through a competitive bid process for the actual channel construction. The Alaska Department of Fish and Game has the enhancement, restoration and fish cultural expertise to implement the instream restoration portion of the project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This instream habitat restoration project is the only EVOS related project on the Kenai Peninsula and Lower Cook Inlet currently being considered for further funding. There is no efforts to coordinate with other projects at this time.

FY 95 BUDGET ($K)

Personnel	19.3
Travel	1.5
Contractual	3.3
Commodities	4.0
Equipment	2.0
Subtotal	30.1
Gen. Admin.	3.1
Total	33.2

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Montague Riparian Rehabilitation Monitoring Program

Project Number:	95139C
Restoration Category:	Habitat Protection (new)
Proposed By:	USFS
Cost FY 95:	$46,200
Cost FY 96:	$43,100
Total Cost:	$89,300
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Commercial fishing

INTRODUCTION

In FY 94, the Cordova Ranger District received funding to construct 25 to 30 structures in streams flowing through clearcut areas on Montague Island. These structures were designed to improve fish spawning and rearing habitat, prevent erosion, and help restore the natural flows and stream features that existed prior to logging. The 1994 work also includes the improvement of 20 acres of riparian vegetation.

In FY 95, the District proposes to evaluate these structures, repair any damage that may have occurred, and assess changes in the aquatic habitat, stream channels, and substrates. The riparian vegetation work will also be evaluated.

NEED FOR THE PROJECT

While instream structures have been used successfully in the Pacific Northwest and in some of the smaller streams on the Cordova Ranger District, this will be the first time such structures have been placed on Montague Island. Because of the climate and topography, the streams on the west side of the island are subject to intense flows. Although we feel confident that the structures will hold up to the flows, the extreme conditions may have some unforeseen effects. This project is somewhat experimental because it is being carried out in a remote area by a small crew using hand tools. Most other restoration work has involved heavy equipment where road access has been available.

We need to evaluate the effectiveness of these structures. If the structures prove to be successful, the same methods could be used to treat streams in other logged areas on Montague Island. The scope of the present structure work has been limited mainly to Hanning Creek, but there are several other streams which could benefit from this type of activity if it proves successful.

This work might also prove effective in other logged areas in Prince William Sound. The Port Fidalgo area, for example, also has steep slopes, high rainfall, and streams with highly variable flows.

PROJECT DESIGN

A. Objectives

1. Determine the changes in channel structure, fish habitat, and substrate at each of the structure sites and in an untreated area downstream.

2. Assess the riparian vegetation work by determining the survival rate of planted seedlings and the effectiveness of tree thinning.

B. Methods

Changes in the stream channels will be evaluated by mapping pools, riffles, backwaters, and other features before and after construction. Depth and substrate sizes in each of these areas will be recorded. Fish habitat, such as spawning and rearing area, will be assessed. A 100-yard segment, downstream of the structures, will also be mapped to assess the cumulative effects of the structures upstream.

The effectiveness of the structures will subsequently be evaluated in several ways. Since some of the structures are meant to re-create pool and backwater areas lost due to logging, their success can be measured by an increase in these features. Other structures meant to disperse energy and help moderate flows can be assessed indirectly by changes in substrate sizes or the formation of bars and other depositional features.

To evaluate the effectiveness of the tree planting, the main objective would be to determine the percentage of seedling survival. The roots and crowns can also be examined to assess growth and health. Competition from other species, such as alder and salmonberry should be assessed as well. The effectiveness of thinning is more difficult to quantify. Generally, however, such factors as growth, sunburned stems, and windthrow should be noted so that a general assessment of the work can be made.

Monitoring should continue at least through 1997, although the workload should decrease after the first year. The effectiveness of the structures may be apparent only after several periods of high water. The success of the vegetation work will take much longer to fully assess.

C. Schedule

Monitoring of the structures during the first year should be done at high and low flows. Monitoring of the vegetation work can be done after the growing season.

April 1995	Prepare equipment, personnel, and perform other preliminary work.
May 1995	Monitor structures at high flow. Map stream channel effects at structures and areas downstream.
Mid-July 1995	Monitor structures at low flow. Map stream channel effects at structures and areas downstream. Assess use of fish habitat.
September 1995	Monitor use of spawning areas and other fish habitat. Assess vegetation. Input and analyze information. Complete reports.

D. Technical Support

All work can be carried out by USFS personnel. No outside technical support is needed. A silviculturist will be needed to help with the assessment of the vegetation work. A GIS specialist will be used for entering the information into the GIS system.

E. Location

Hanning Creek (ADF&G stream # 710) Blying Sound D-1, 2 quadrangle, R10E, T3S, section 2 SE 1/4; Swamp Creek (ADF&G # 739) Seward A-1 quadrangle, R12E, T1N, section 11, SE 1/4 and section 12, SW 1/4; and ADF&G streams 734, 735, 736, Seward A-2 quadrangle, R12E, T1S, section 4 NE 1/4 and section 33 SW 1/4.

PROJECT IMPLEMENTATION

To be carried out by the Cordova Ranger District USFS.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Not applicable.

FY 95 BUDGET ($K)

Personnel	31.7
Travel	0.0
Contractual	4.2
Commodities	1.8
Equipment	3.5
Subtotal	41.2
Gen. Admin.	5.0
Total	46.2

Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in Prince William Sound

Project Number:	95159
Restoration Category:	Monitoring (continued)
Proposed By:	DOI
Cost FY 95:	$426,800
Cost FY 96:	$65,000 (data analysis and report writing only)
Total Cost:	$491,800
Duration:	2 years (survey should be conducted every other year)
Geographic Area:	Prince William Sound
Injured Resource/Service:	Marbled murrelet, pigeon guillemot, black oystercatcher, harlequin duck, and sea otter

INTRODUCTION

The waters and shorelines of Prince William Sound (PWS) support abundant marine bird and sea otter (*Enhydra lutris*) populations throughout the year. Potential injuries to marine birds from exposure to the *T/V Exxon Valdez* oil spill included, but were not limited to, death, changes in behavior, and decreased productivity. Post-spill studies, identical to the one proposed here, suggested that the population abundance of several marine bird species and sea otters declined as a result of the oil spill. Using surveys by small boats, this project will collect additional information to monitor the distribution and abundance of marine birds and sea otters in PWS. These post-spill data will be compared to data collected previously in 1989-91, 1993, and 1994 to ascertain trends in marine bird and sea otter distribution and abundance in PWS. This project will benefit restoration of PWS by determining additional species that show a latent oil spill effect and whether populations that declined due to the spill are recovering and by identifying what species are still of concern.

NEED FOR THE PROJECT

Almost 30,000 bird and 900 sea otter carcasses were recovered following the spill. Based on modeling studies using carcass search effort, and population data, an estimated 300,000 - 645,000 marine birds were killed in PWS and the northern Gulf of Alaska by the oil spill. Garrott, et al estimated that 2,800 sea otters were also killed. These estimates are probably low because they only include direct mortality occurring in the first five months after the spill.

The U.S. Fish and Wildlife Service conducted boat surveys of marine bird and sea otter populations in PWS in 1972-73, 1984-85, and several years following the spill (1989, 1990, 1991, 1993, and 1994). Klosiewski and Laing documented overall declines in 15 species or species groups between 1972-73 and the years after the spill. When comparing population estimates with 1984 data, Klosiewski and Laing documented decline of six species or groups within shoreline habitats in the oiled zone relative to the unoiled zone.

Burns, using data from the boat surveys, documented declines in sea otter abundance in shoreline habitats of PWS following the spill. He also detected a continuing pattern of significantly lower sea otter densities in oiled coastal areas, suggesting that mortality in or displacement of sea otters from these areas occurred. Agler et al examined whether species shown to decline had recovered. Most species or groups showed no trends in population abundance since the *Exxon Valdez* oil spill, although results were inconclusive due to the few years of data available. In 1993, two new species showed a latent oil spill effect. Klosiewski and Laing used Monte Carlo simulations to examine the power of determining trends from these data. These simulations showed that the number of surveys conducted has a large influence on whether a trend can be detected.

This project has several benefits. Restoration of marine bird and sea otter populations requires population estimates to determine whether recovery is occurring or if declines are continuing. Agler et al also found additional populations declining that were not previously shown to be injured. This project will benefit marine birds and sea otters by revealing species that show continuing injury due to the *T/V Exxon Valdez* oil spill. Survey data from this project have been used for these purposes by investigators of other studies on pigeon guillemots, marbled murrelets, black oystercatchers, and sea otters.

PROJECT DESIGN

A. Objectives

The purpose of this study is to obtain population estimates of marine birds and sea otters in PWS to monitor the recovery of species whose populations may have declined due to the T/V *Exxon Valdez* oil spill and to determine whether additional species may still be declining as a result of the oil spill.

The specific objectives of this project include:

1. To determine distribution and estimate population abundance, with 95% confidence limits, of marine bird and sea otter populations in Prince William Sound during March and July 1995;

2. To determine whether the marine bird species whose populations declined more in oiled areas than in non-oiled areas of PWS have recovered;

3. To determine whether additional species begin to show oil spill effects;

4. To examine the relative abundance of common species groups over time;

5. To support restoration studies on harlequin duck, black oystercatcher, pigeon guillemot, marbled murrelet, and sea otter by providing data on population changes, distribution, and habitat use of PWS populations; and

6. To examine the temporal variation in populations of marine birds in small index areas (i.e., Chenega, Tatitlek).

B. Methods

1. Study Area: Prince William Sound is a large embayment of the northern Gulf of Alaska. The rugged coastline is dominated by the Chugach Mountains, which drop precipitously to the shoreline in an intricate pattern of fjords and bays. Including the mainland and more than 150 islands, PWS contains over 5000 km of shoreline. The depth of PWS varies from <1 fathom (2 m) on Middle Ground Shoal to >475 fathoms (870 m) east of Lone Island. The study area includes all water within PWS, as well as land within 100 m of the shoreline. The waters on the Gulf of Alaska side of Montague, Hinchinbrook and Hawkins Islands, as well as Orca Inlet, are excluded.

2. Sampling Methods: Survey methodology will remain identical to that of post-spill surveys conducted in 1989, 1990, 1991, 1993, and 1994. We will conduct two surveys during 1995. We will use three 25-foot fiberglass boats, which are currently under U.S. Fish and Wildlife Service jurisdiction, to survey transects over a three week period during March and July 1995.

   We plan to redesign the sampling design of the survey to increase precision of our estimates. We will continue to use a stratified random sampling design containing 3 strata, shoreline, coastal-pelagic, and pelagic. Instead of dividing the Sound into 5-minute latitude-longitude blocks as in the past, we will divide the area into one minute latitude by 2-minute longitude blocks to determine the starting points for our transects. We have use a similar design in surveys of Lower Cook Inlet and Southeast Alaska. At the latitude of the study area, the blocks of the grid will be approximately 1 nautical mile (nm) square. In the same amount of time, we will be able to sample many more of these

short transects, which will allow us to cover more area and should provide greater precision of our population estimates.

Temporal studies will be conducted annually in a limited area near both Chenega and Tatitlek by local people. Surveys would be conducted every month, January-December, as close to the first of the month as weather permits.

3. Data Analysis: As in previous surveys, we will use a ratio estimator to estimate population abundance. Population estimates for each species will be combined with other post-oil spill population estimates to determine population trends. Regression analyses will be used to determine the recovery of injured species and population changes of other species.

C. Schedule

Jan - Feb 95	Hire personnel, make logistical arrangements for winter survey
Mar 95	Conduct winter survey in PWS
Apr 95	Return to Anchorage, enter data, and store equipment
May 95	Hire personnel, make logistical arrangements for summer survey
July 95	Conduct summer survey in PWS
Aug - Sept 95	Analyze data from 1995 surveys

D. Technical Support

All technical aspects, such as GIS, will be conducted by project personnel; therefore, outside technical support is not needed.

E. Location

This study will be conducted in PWS. The study area includes all water within PWS, as well as land within 100 m of the shoreline.

PROJECT IMPLEMENTATION

The Division of Migratory Bird Management (MBM) of the U.S. Fish and Wildlife Service has conducted several surveys to estimate the population abundance and distribution of marine birds and sea otters in PWS. Surveys were conducted prior to the *Exxon Valdez* oil spill during 1972-73 and 1984-85, and for several years after the oil spill (1989-91, 1993, and 1994). MBM also has conducted several other studies within PWS. MBM has monitored reproduction of black-legged kittiwakes for over ten years and has been conducting research in PWS on marbled murrelets, pigeon guillemots, and black oystercatchers for several years. During 1994, MBM staff will also participate in a coordinated effort with NOAA to study forage fish within PWS.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will provide valuable information on the distribution and habitat use of marine birds and sea otters in PWS. This project is being coordinated with other DOI-FWS and NBS seabird monitoring studies in PWS and elsewhere (i.e., Lower Cook Inlet, Southeast Alaska). Survey data from this project will be available for use by investigators of other studies on marbled murrelets, black oystercatchers, pigeon guillemots, black-legged kittiwakes, forage fish, and sea otters.

FY 95 BUDGET ($K)

Personnel	202.2
Travel	14.0
Contractual	111.0
Commodities	34.5
Equipment	27.0
Subtotal	388.7
Gen. Admin.	38.1
Total	426.8

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Abundance and Distribution of Forage Fish and Their Influence on Recovery on Injured Species

Project Number:	95163
Restoration Category:	Research (continuation of 94163)
Proposed By:	NOAA
Cooperating Agencies:	ADFG, DOI
Cost FY 95:	$1,294,600 (includes $173,600 for data analysis and report writing of FY 94 work)
Cost FY 96:	$285,400
Total Cost:	Unknown
Duration:	6 years
Geographic Area:	Prince William Sound and adjacent Gulf of Alaska waters
Injured Resource/Service:	Multiple resources

INTRODUCTION

A better understanding is needed of how prey availability affects distribution, abundance, growth and reproductive success of apex predators. Efforts to restore predatory species affected by the oil spill, particularly harbor seals, pigeon guillemots, marbled murrelets, common murres, black-legged kittiwakes, and salmon, could be delayed or completely unsuccessful without understanding distribution, abundance, and availability of important forage fish including herring, pollock, sandlance, capelin, and invertebrate species including macrozooplankton and squid.

NEED FOR THE PROJECT

This is the core project of the ecosystem project, Food Limitation on Recovery of Injured Resources: An Ecosystem Approach to the Restoration of Marine Birds and Mammals, a multi-disciplinary project designed to understand the Prince William Sound food web and the associated effects on the injured species.

This project will concentrate on determining distribution, abundance, and availability of important prey species (e.g., herring, pollock, sandlance, capelin, macrozooplankton, squid) to predatory species affected by the oil spill (i.e. harbor seals, pigeon guillemots, marbled murrelets, common murres, black-legged kittiwakes, and pink salmon). Diet overlap and prey selection among forage fish species will also be examined. This information, trophic position and niche overlap among species, will be used to establish the basic structure of future ecosystem models. The models of changing oceanographic regimes and prey species productivity and distribution would be necessary for understanding recovery of predatory species, and useful in guiding recovery activities.

PROJECT DESIGN

The forage fish project will evaluate existing field methods used in determining distribution, abundance, availability and class composition of forage fish. Provisions will be included to model affects of changing oceanographic regimes on forage fish species' distribution, abundance, and productivity.

The 1995 sampling program will be an expansion of the 1994 pilot project (94163) to determine distribution, densities and species composition of forage fish species. This project will also provide information on sex, age, growth, food habits, recruitment, and mortality of forage fish species. Field surveys will determine where apex predators forage and the distribution, abundance, and availability of forage fish of both nearshore and offshore waters within Prince William Sound and adjacent Gulf of Alaska waters. Ecosystem models to estimate biomass and productivity of forage fish species will be evaluated, and begun to be developed.

A. Objectives

This project will determine temporal and spatial distribution, abundance, and availability of important prey species (e.g., herring, pollock, sandlance, capelin, macrozooplankton, squid) in Prince William Sound and adjacent Gulf of Alaska waters. It will attempt to determine how important biotic and abiotic factors affect both short- and long-term distribution and abundance of prey species in the oil spill area. It will also determine how predator distribution, abundance, and foraging strategy coincide with forage fish distribution and abundance.

In 1995, the project's objectives are:

1. Evaluate existing field methods used in determining distribution, abundance and availability of forage fish.

2. Determine temporal and spatial distribution and abundance of prey species using hydroacoustic surveys and net sampling.

3. Investigate the relationships between forage fish abundance and distribution with oceanographic parameters.

4. Initiate development of ecosystem models to understand factors influencing distribution, abundance, and composition of forage fish.

5. Investigate relationships of forage fish abundance to marine birds and mammal abundance and productivity, in conjunction with complementary studies directed towards these species.

6. Determine forage fish prey using stomach content analysis for fish collected from nearshore and offshore sites, and estimate degree of diet overlap among species.

B. Methods

This project will ground-truth existing field methods used in determining distribution, abundance and availability of important prey species. It will conduct both coarse and fine scale hydroacoustic surveys and determine forage fish composition and sizes by net sampling. Coarse scale surveys will consist of line transects spaced throughout PWS. Fine scale surveys will occur at two to four locations known to be sea bird or marine mammal feeding areas. Both coarse and fine scale surveys will be conducted at least monthly from April through August. Four permanent hydroacoustics stations will be established to observe temporal patterns in prey abundances within and between years.

During hydroacoustic surveys, simultaneous bird and mammal surveys will take place from the same vessel(s). Data from this study will be combined with data from other seabird studies to compare relative fish abundance to foraging behavior and reproductive success of marbled murrelets, pigeon guillemots, and black-legged kittiwakes.

Forage fish will be sampled in nearshore and offshore areas using nets. Each species will be identified and length and weight measured on a minimum of 150 individuals randomly selected in each sample. Fifteen fish from each species will be preserved from each sample for later analysis of stomach contents. Additional samples will be collected for later lipid and stable isotope analysis.

C. Schedule

The forage fish surveys will be conducted under contract. The contractor work will conduct hydroacoustic and net sampling surveys at monthly intervals from spring to late summer. Annual reports will include progress on refining the forage fish models. A project status report will be submitted by the contractor in December 1995 which will discuss existing field methods

used in determining distribution, abundance, and availability of important prey species, and the process and justifications for selected survey techniques. The report will present and discuss the results of the field surveys including locations of forage fish and, when possible, the biomass of these species, and forage fish prey as determined from stomach content analysis. The contractor, in collaboration with NOAA, ADFG and USFWS, will report on the correlation of forage fish distribution and abundance with marine birds (marbled murrelet, pigeon guillemot, black-legged kittiwake) and mammal abundance and productivity. The report will also describe and evaluate ecological models to estimate productivity of important prey species, and a sampling program to fulfill requirements of ecological models. Annual reports will include progress on refining the productivity models.

Field Studies	
April - August 1995	Contractor field sampling
Laboratory & Data Analyses	
June 1 - December 31, 1995	Conduct stomach contents analysis
January 1, 1996 - March 31, 1996	Analyze data and prepare annual report due within four months after cruise; submit draft annual project report

D. Technical Support

This project will generate data which will be useful to the monitoring projects and studies currently underway in Prince William Sound. In order to insure access to these data, the information collected from this project will be incorporated into a data base managed by the Trustee Council.

E. Location

This project will concentrate its initial activities within Prince William Sound. However, some sampling design feasibility work may be performed in Gulf of Alaska waters adjacent to Prince William Sound.

PROJECT IMPLEMENTATION

This project will be contracted and coordinated by NOAA with cooperative components conducted by ADFG and USFWS.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be highly integrated with several components of the SEA Program and several of the marine bird and marine mammals projects. The Physical Oceanography, Nearshore Fish, Zooplankton, and Phytoplankton components of SEA will collect data relevant to forage fish

distribution and production. Within the SEA Physical Oceanography component, conductivity-temperature-depth (CTD) profilers and Acoustic Doppler Current Profilers (ADCP) will be deployed from a mid-water trawl vessel. Within the SEA Nearshore Fish component, hydroacoustic data will be obtained in offshore habitats from a mid-water trawl vessel and in nearshore habitats from small hydroacoustic survey boats. Within the SEA Zooplankton and Phytoplankton components, zooplankton and water samples will be collected using nets and water bottles. The Salmon Growth and Salmon Predation components of SEA will collect forage fish samples for later stomach contents analysis in offshore and nearshore habitats using mid-water trawls, and beach and purse seines. Age-weight-length data will be collected from the forage fish to accompany hydroacoustic data. All data collected as part of SEA will be provided to the Information and Modeling component for use in development and implementation of ecosystem models.

The forage fish study and the marbled murrelet, pigeon guillemot, and kittiwake studies will provide complementary and integral information to determine if food is limiting the recovery of sea bird species. Data on seabird foraging and reproductive parameters will be compared to the forage fish assessment data to investigation the relationship of food availability or limitation to seabird productivity.

FY 95 BUDGET ($K)

Personnel	274.2
Travel	24.3
Contractual	882.3
Commodities	7.4
Equipment	26.0
Subtotal	1214.2
Gen. Admin.	80.4
Total	1294.6

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Herring Natal Habitats

Project Number:	95166
Restoration Category:	Monitoring (continuation of 94166)
Proposed By:	ADFG and University of Alaska Juneau
Lead Trustee Agency:	ADFG
Cost FY 95:	$512,800 (includes $238,600 for data analysis and report writing of FY 94 work)
Cost FY 96:	$457,500
Total Cost:	Unknown
Duration:	6-8 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring

INTRODUCTION

This project provides a direct measure of Pacific herring *Clupea pallasi* abundance that is vital to monitoring recovery of the injured PWS herring population. It also provides information about survival of herring eggs and information necessary for interpretation of previous oil spill damage assessment results and improvement of our understanding of long term damage. In addition, abundance estimates from this project are used to set commercial harvest strategies, thereby contributing to the recovery process for PWS herring populations.

Studies of oil spill injuries to herring were initiated in 1989 and continued through 1992 with contributions from both state general funds and the Trustee Council. Oil spill injuries were documented, primarily to embryo and juvenile life stages. PWS herring attained historic high population levels in the four years following the spill, and EVOS herring studies were not conducted in 1993. In 1993 the herring population unexpectedly crashed and population declines continued into 1994. Herring are currently listed as not recovering. Spawn deposition surveys, estimates of eggs lost due to predation and wave action, and laboratory studies of reproductive impairment were conducted in 1994 under Trustee Council funding. Spawn deposition surveys are currently considered the best available method for estimating population abundance. Surveys should continue for one recruitment cycle (4 years) or until the efficacy of an alternative abundance estimation method is proven.

NEED FOR THE PROJECT

Pacific herring are a major resource in Prince William Sound (PWS) from both commercial and ecological perspectives. Five commercial herring fisheries in PWS have an average annual combined ex-vessel value of $8.3 million. Pacific herring provide important forage for many species including some species severely injured by the *Exxon Valdez* oil spill. Predator species include humpback whales, seals, sea lions, gulls, sea ducks, shorebirds, halibut, salmon, rockfish, and other fish. In addition, several thousand pounds of herring and herring spawn on kelp are harvested annually for subsistence purposes and form an important part of the local native culture.

In 1993, the total observed spawning population of PWS herring was less than one third of preseason predictions and the average sizes of herring in each age class were some of the smallest on record. Only limited commercial herring fishing occurred. Preliminary pathology results implicated viral hemorrhagic septicemia (VHS) as a potential source of mortality and stress. In 1994, as in 1993, the spawning population was again below pre-season predictions. Aerial surveys indicated the population was less than minimum threshold harvest levels and no commercial fishing was allowed. The ex-vessel value of the herring fisheries in 1992 was $12.0. In 1993, the ex-vessel value dropped to $2.0 million and no commercial harvest occurred in 1994. This project will enable resource managers to better understand herring population dynamics to improve the recovery process. In addition, it will aid local resource users to make appropriate pre-season plans based on accurate and precise herring return projections.

In response to the low apparent return, a comprehensive pathology study was initiated in 1994 to determine whether VHS plays a role in the apparent decline in the herring spawning population and to try to determine the magnitude of the effect. It is not clear whether the *Exxon Valdez* oil spill may be implicated, although numerous studies have indicated that previous exposure to toxins can reduce immunity to disease. Continuation and completion of the pathology study is being proposed for FY95. Population abundance information from spawn deposition surveys is prerequisite for meaningful interpretation of pathology results.

The cost of this project is reasonable considering the economic value of the commercial fisheries as well as the important contribution that herring of all life stages make to the PWS ecosystem.

PROJECT DESIGN

This project will be conducted in several parts. ADFG will perform the field component constituting the continuation of herring spawn deposition surveys and egg loss studies in PWS. New elements for this component will include: (1) digitizing of historic spawn distribution information into geographical information system (GIS) format and development of descriptive measurements appropriate for analysis of spawning habitat use, (2) estimation of the incidence of cytogenetic abnormalities occurring in hatching herring, (3) modeling of embryo survival and recruitment in relation to biological and environmental variables. Prince William Sound

Science Center will be contracted to perform the spawn map digitizing. Dr. JoEllen Hose with Occidental University will perform the cytogenetic abnormality examinations and data analyses. Dr. Terry Quinn with the University of Alaska, Juneau, will oversee the modeling.

During spawn deposition surveys, SCUBA divers will estimate the abundance and distribution of herring eggs. This information will be incorporated with aerial observations of spawn distribution and basic biological information collected as part of ongoing ADFG studies (age composition, sex ratios, average size, and fecundity) to estimate adult spawning biomass. Estimates of spawning biomass are used to forecast spawning returns the following year and form the basis of herring fishery management in PWS. New and existing data will be used to develop a classification system for spawning habitat types. Habitat use and spawner/egg density and distribution data collected during this project are needed to develop herring embryo survival models outlined in the Natal Habitat Program (NHP) of Sound Ecosystem Assessment (SEA).

The egg loss study will provide estimates of herring embryos physically removed from spawning areas by predation and wave action. Estimation of egg loss is useful (1) to improve accuracy of biomass estimates by accounting for eggs lost between the time of spawning and the time of spawn surveys and (2) as an important element in the estimation total embryo survival. Total embryo survival to the larval life stage is necessary as an initial population abundance input for life history models described in SEA. Improved understanding of larval production dynamics is also an important adjunct to improving our understanding of processes affecting herring recruitment.

Factors directly affecting survival of embryos to larvae include losses due to wave action and predation, desiccation at low tide, cytogenetic abnormalities (which result in nonviable hatched larvae), pathogens, and pollution (which may elevate cytogenetic abnormality levels). These sources of direct mortality may be modified by environmental and biological variables such as wind direction and severity of storms, number of predators present and the availability of eggs to predators, the type of substrate on which eggs are deposited, height of tidal fluctuation, water temperature, and air temperature. The degree to which these modifiers of direct mortality affect survival depends largely on the characteristics of the habitat used for egg deposition. Because it is not practical to measure all sources of morality each year, total embryo survival models will be used to relate mortality to more easily measured or estimated environmental and biological variables and habitat selected.

A. Objectives

1. Estimate the biomass of spawning herring in PWS using SCUBA diving spawn deposition survey techniques such that the estimate is within ± 25% of the true value 95% of the time.

2. Quantify egg loss rates (the proportion of eggs removed through time) from spawning areas due to wave action, predation, desiccation, or fungal infections between the time of egg deposition (spawning) and the time of hatching. Quantify egg loss by habitat type and egg density.

3. Incorporate egg loss and egg survival estimates with results from previous studies and revise the models as necessary.

4. Describe herring spawning habitat with respect to temperature, salinity, depth, gradient, substrate, vegetation, and exposure to wave action. Map habitat historically utilized for spawning. Estimate habitat specific abundance and distribution of adult herring and eggs. Test a model of the relationship of spawn timing, spawner density and abundance to egg distribution and density.

5. Incorporate egg loss and survival data with physical oceanographic and meteorological data to formulate and test a model of the relationship of meteorological conditions to wave height and egg desiccation.

6. Test a model of the relationship between predation, wave action, desiccation, fungal infections, egg density, and habitat utilized.

7. Test a model relating sound-wide embryo survival to habitat utilized, egg density, and meteorological conditions.

8. Test a model relating historic recruitment success to biological and environmental variables.

B. Methods

Biomass estimation based on spawn deposition surveys consisted of three major components: (1) a spawn deposition survey; (2) age-weight-length (AWL), sex ratio, and fecundity sampling; and (3) egg loss determination.

Spawn Deposition Surveys. Survey design was described in detail by Biggs and Funk, and follows closely the two-stage sampling design of similar surveys in British Columbia and Southeast Alaska. Surveys will use random sampling for the first stage (transects) and systematic sampling for the second stage (quadrats within transects). Surveys will be stratified by area to account for geographic differences and the potential for discrete herring stocks.

Mean egg densities along each transect will be combined to estimate an average egg density by area. Spawning bed width along each of the transects will be used to calculate average spawning bed width by area. Average width, average density, and total spawning bed shoreline length will be used to estimate total number of eggs deposited in each area. Average fecundity, sex ratio, and estimates of total number of eggs deposited will be used to calculate herring population numbers and biomass. Confidence intervals will be calculated assuming a normal distribution of total egg estimates.

The general location of spawning activity will be determined from milt observed during scheduled aerial surveys. This information will be used to randomly select and locate transects. Each transect will be assigned a sequential number and charted on waterproof field maps.

Diving on herring spawn will begin after spawning has ceased. Two three-person dive teams will complete approximately six to twelve transects each day to achieve sample goal of about 100 transects. The sample goal of selected transects will be established based on the total length of beaches receiving spawn and variability observed in previous surveys.

Using a 0.1 m^2 PVC pipe frame for a sampling quadrat, the number of eggs, substrate, and vegetation type will be estimated for quadrat locations systematically spaced every 5 meters along a transect until the apparent end of spawn. Samples of eggs and vegetation will be used to correct for diver bias. These diver calibration samples will be collected throughout the dive survey and stratified by diver, vegetation type, and by egg density.

Estimates of the biomass of spawning herring will be calculated from estimates of deposited eggs, fecundity, sex ratio, average size, and age composition similar to methods described by Biggs and Funk and Biggs et al. Predictions of returning biomass in the following year will be estimated using methods similar to those described by Funk (1994).

Herring Age, Weight, Length, Sex, and Fecundity. This portion of the project is part of an existing agency program that is conducted annually by ADFG. AWL information will be collected from major concentrations of herring spawning in each area. AWL sampling will be stratified by date and area for each commercial fishery and for test fishing catches in each spawning area. A sample size of 450 herring per stratum will be set to ensure acceptable levels of precision and accuracy. Fecundity samples will be subsampled from among female herring AWL samples and stratified by fish length. Egg and gonad weights will be measured and used to calculate average fecundity at an average female weight. Gonad weight will be used to estimate gonadal somatic index (GSI), a measure of relative maturity defined as the percentage of total herring weight accounted for by gonad weight.

Mean weight and sex ratio will be estimated from AWL samples collected from each of the five spawn deposition summary areas. AWL samples collected during peak spawning in each area will be pooled to estimate mean weight and sex ratio for that area. Average weight and sex ratio for PWS will be estimated as a weighted average of estimates from all areas. Average weight and sex ratio for each area will be weighted by the escapement biomass estimate based on spawn deposition surveys for that area.

Egg Loss. Egg loss was studied during 1990 and 1991 in PWS and an average daily egg loss rate of 2.1% and an average total egg loss of 50.4% over the 22.5 day incubation period were reported. Previous studies did not include collection of data to relate egg loss to habitat type, environmental conditions, or predation. The current study will include modifications to sampling design to improve understanding of these mechanisms behind egg loss. This information and previous results will be used to model embryo survival. Egg loss transects will be established in two areas chosen to represent major spawning areas and will be located within areas to represent typical habitats selected for spawning. PVC pipe grids of 5 x 2 permanent 0.1 m^2 quadrats will be placed along each transect at depths within the range of usual herring spawn. Each transect will be visited every three to four days and divers will make estimates of egg density within each 0.1 m^2 quadrat.

A sample containing about 200 eggs will be collected adjacent to each frame during each visit at each depth. Live/dead ratios will be estimated and the eggs will be examined for any signs of egg desiccation and fungal infection. Just prior to hatch, a subsample of live embryos collected for live/dead examination will be immersed in preservative for later evaluation of morphological abnormalities and cytogenetics.

Exclusion frames of approximately 1 m^3 in volume will be placed at representative transect locations to exclude avian predators. The total count of eggs within each frame will be estimated each time the site is visited to estimate the number of eggs consumed by birds. These data will contribute prey availability information to the avian predation on herring roe component of SEA.

Physical measurements including air and water temperature, salinity, precipitation, wind speed and direction, and tide height will be collected at each site during each visit. Measurements of gradient, substrate and vegetation will be collected once when the site is set up. Regional meteorological and oceanographic data will be obtained from shipboard surveys, moored instrumentation, and existing data products from government agencies. These measurements will be used to model the effect of meteorological conditions on egg loss and embryo survival.

Egg Loss Data Analysis. An exponential decay model will be used to estimate loss in numbers of eggs over time corrected for diver bias. Egg loss and egg survival estimates will be synthesized into an embryo survival model that incorporates habitat type and predation. Preliminary analysis of previous egg loss data and embryo survival modeling will be completed in FY 94 and will be used to formulate specific sampling design modifications for FY 95.

C. Schedule

Jul - Sept 94	Egg loss data analysis and embryo survival modeling
Aug 94	Complete Detailed Project Description
Dec 94	Complete FY94 progress report
Nov 94 - Feb 95	Initiate vessel charter bids and contract
	Secure divers, ensure certification requirements are met or in progress
	Complete data review and sample design for egg loss study
	Complete sample design for diver calibration
Mar 95	Complete any necessary diver certifications
	Order laboratory supplies and field supplies
	Hire personnel to maintain and assemble dive gear
1-5 Apr 95	Complete all hiring of field personnel and arrange for arrival of divers
	Vessel arrives on site for inspection
1-4 Apr 95	HazMat, CPR/First Aid and Dive Safety training; Project orientation
	Set up laboratory
5-15 Apr 95	Initiate diving/field data collection (at onset of spawning)
	Set up egg loss sites and begin diving
1-15 May 95	Complete field activities
	Begin lab processing of calibration, fecundity, and egg loss samples
30 May 95	Complete data entry of diver estimates
May-Jun 95	Maintain, repair, and store gear
15 Jun 95	Complete calibration sample processing
30 Jun 95	Data entry of calibration samples
	Initiate data analysis
15 July 95	Complete egg loss sample processing and data entry
15 Aug 95	Preliminary biomass estimate
1 Sep 95	Finalize estimate of spawning biomass
15 Nov 95	Finalize projection of 1995 run biomass
Dec 95	Complete annual reports

D. Technical Support

ADFG regional and headquarters biometric staff will assist in project planning, review, and reporting for this project. They will also provide primary assistance for analysis of spawn deposition data and generation of biomass estimates using partial funding from this project. Additional biometric and modelling assistance for egg loss data analysis will be obtained through hiring and half time funding for a Biometrician I with ADFG. Remaining biometric and modelling assistance will be contracted through a Cooperative Service Agreement (CSA) or a Reciprocal Service Agreement (RSA).

Primary databases and analytical files will be stored on the local area network (LAN) of the Cordova ADFG office and technical assistance for database management for FY94 will be provided by the Cordova office network administrator. Some database management needs will be accommodated through funding for a research analyst or equivalent part time position beginning in FY95. In addition, we will coordinate with the SEA plan data managers to ensure that future incorporation and integration with their system can be accomplished.

Laboratory services will be completed at the Cordova ADFG office with the exception of some collections of intertidal invertebrates and fishes, and samples collected for cytogenetic analysis. The intertidal predator samples will be transferred to the Copper River Delta Institute of the USFS to complete their research objectives. Analysis of cytogenetic samples will be subcontracted in FY95.

E. Location

This project will be conducted entirely within PWS and it is expected that project results will directly affect the management of PWS herring fisheries. The communities directly affected that house fishermen, vessels involved in the fisheries, processing plants, and support services for the fisheries include Cordova, Seward, Valdez, and Whittier. The subsistence harvests of the native villages of Tatitlek and Chenega will also be directly affected.

PROJECT IMPLEMENTATION

ADFG has the experience and resources to perform the field work associated with this project. Regular ongoing herring research activities conducted by ADFG are an integral part of the data collection. Biometric assistance and laboratory analysis will be provided by ADFG staff or obtained through a RSA with the University of Alaska, Juneau, through Dr. Terrence Quinn. A major component of egg loss, avian predation, will be estimated through a companion project conducted by the Copper River Delta Institute as a component of SEA.

Dr. JoEllen Hose, Occidental College, Los Angeles, CA will be contracted to perform cytogenetic analysis of herring larvae. Dr. Hose developed the techniques used to analyze oil spill damage to PWS herring and is the logical choice for this contract due to her experience with these data.

Digitizing of historic spawn maps may be done by Dr. David Scheel with the Prince William Sound Science Center under a CSA or obtained through competitive bid process.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The proposed study is a continuation of damage assessment studies begun in 1989. In addition, it is a major component of the integrated Prince William Sound Ecosystem Assessment (SEA) investigation initiated in 1994. This project provides the basic estimate of population abundance necessary to completion of most other herring research components. Estimates of total embryo survival from modeling of egg loss/mortality studies, habitat studies, and an avian predation study form the initial inputs for herring life history based models integral to SEA. Herring recruitment modeling portions of the proposed study will provide information about critical life stages needed to refine project design of the juvenile herring trophics and habitat partitioning study component of SEA.

This project will also share information and resources with the herring genetic stock identification study.

Integration of research will require data sharing and coordination with PWS forage fish studies. Because herring are an important forage species, their abundance and distribution information must be integrated with the composition, abundance, and distribution information of other fish species. Because herring and other forage fish may be potential predators, competitors, and prey for each other at various stages throughout their life histories, understanding their respective population structures will improve our understanding of herring early life history and recruitment.

Two other projects, disease impacts on PWS herring populations and reproductive impairment of PWS herring, will require sharing of research platforms and extensive exchange of data and results.

FY 95 BUDGET ($K)

Personnel	195.7
Travel	4.8
Contractual	248.6
Commodities	11.9
Equipment	5.1
Subtotal	466.1
Gen. Admin.	46.7
Total	512.8

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Factors Affecting the Recovery of Prince William Sound Pigeon Guillemot Populations

Project Number:	95173
Restoration Category:	Research (continuation of 94173)
Proposed By:	DOI
Cost FY 95:	$408,800 (includes data analysis and report writing costs)
Cost FY 96:	$360,100
Total Cost:	$1,889,600
Duration:	5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pigeon guillemot

INTRODUCTION

The population of pigeon guillemots (*Cepphus columba*) in Prince William Sound (PWS) has decreased from about 15,000 in the 1970s to about 3,000 in 1993. There is evidence suggesting that this population was in decline before the *Exxon Valdez* oil spill in March of 1989. An estimated 2,000 to 3,000 pigeon guillemots were killed throughout the spill zone during that event. Censuses of guillemots conducted before and after the spill indicated that pre-spill counts (ca. 2,000) in the study area (Naked Island and vicinity) monitored during Bird Study Number 9 were roughly twice that of post-spill counts (ca. 1,000). Also, relative declines in the populations of guillemots were greater along oiled shorelines than unoiled shorelines. Latent effects from the spill might still be affecting the population because guillemots do not breed until three or four years of age.

Adult guillemots delivered schooling fish, particularly sand lance (*Ammodytes hexapterus*), to their chicks less frequently after than before the spill suggesting a possible food-related component to their decline. Predation of eggs and chicks, apparently not important previously, might now play a greater role in the lower reproductive success of guillemots observed by Oakley and Kuletz.

This study is a continuation of the pigeon guillemot Recovery Monitoring Project (No. 94173), and an extensive survey of pigeon guillemot colonies in PWS (Project No. 93034). Bird Study Number 9, begun in 1989 immediately after the oil spill, compared various population and reproductive parameters of pigeon guillemots measured both before and after the spill.

The goal of the present study is to determine whether food, predation, direct toxicity from oil, or adult mortality is limiting the recovery of the pigeon guillemot population in PWS. Information on the abundance and distribution of schooling fish collected by the forage fish project (No. 94163), in conjunction with our own studies of the guillemots' diet and foraging habits, will help us address the question of food as the limiting factor.

NEED FOR THE PROJECT

Considerable baseline data on pigeon guillemot populations and foraging and reproductive ecology in PWS have been collected both before and after the oil spill. Continuation of these efforts is essential to determine what factors are limiting the recovery of this species. Food supply, predation, or oil toxicity might limit reproductive success. This project will evaluate the relative importance of these three factors.

PROJECT DESIGN

A. Objectives

1. Determine if the availability of food is limiting reproductive success by:

    a. Measuring breeding phenology, egg volume, chick growth rates, fledgling weights, and reproductive success at colonies on Naked Island and at least one other area determined in the 1994 field season.

    b. Measuring diet and provisioning rates of chicks, duration of foraging trips by parents, and location of foraging areas.

    c. Assessing forage fish abundance in guillemot feeding areas (forage fish project).

    d. Assessing abundance of nearshore demersal fishes.

2. Determine if predation on eggs or chicks is limiting reproductive success by measuring relative rates of predation during the egg and chick stage, in different nesting habitats, and at different colonies.

3. Determine if direct toxicity of oil is limiting reproductive success by determining if there is persistent oiling of guillemot eggs.

4. Determine if adult survival and recruitment is limiting recovery of the PWS guillemot population by observing returns of color-marked birds.

B. Methods

Reproductive success will be monitored using standard field techniques involving periodic nest checks. Morphometric data for determining growth rates will be acquired at regular intervals during the chick-rearing period.

Provisioning rates and diets of chicks will be determined whenever possible throughout this period by observing them from strategically located blinds. Radio-tagged birds will be tracked to their foraging grounds.

Predation rates will be recorded for all known nests. Time-lapse videography or that triggered by infrared sensors will be used in an attempt to document predation and identify predators as well as monitor activity budgets of chick-rearing guillemots.

An approved protocol will be used to collect unhatched eggs to be stored and shipped in sealed jars for hydrocarbon analysis. Estimates of adult survival will require the successful marking of breeding adults with color bands during the 1994 and 1995 (and any future) field seasons. Because of the high degree of nest-site fidelity in pigeon guillemots, known breeding birds not sighted the following season will be assumed to be dead. Marked birds are also useful in determining sex, activity budgets, and reproductive histories of individual birds.

C. Schedule

Oct - Dec 94	94173 data analysis
Dec - Jan 95	94173 report writing
Feb 15, 95	94173 draft report
Mar 31, 95	94173 final report
May - Aug 95	Field work/data collection
Sep - Nov 95	95173 data analysis
Dec - Jan 96	95173 report writing
Feb 15, 96	95173 draft report
Mar 31, 96	95173 final report

D. Technical Support

Hydrocarbon analysis will be contracted to Texas A&M University.

E. Location

Naked Island and vicinity, which is surrounded by a shallow shelf, supports only about one fourth of the PWS Pigeon Guillemot population. Because the 1993 pigeon guillemot colony survey showed that Naked Island is not representative of all habitats utilized by guillemots in Prince William Sound, at least one other area selected during 1994 field season will be studied. The other study area(s) will be chosen based on the following criteria: (1) existence of a relatively large number of breeding guillemots, (2) accessibility of nest sites for monitoring, and (3) bathymetric characteristics (deep water relative to that of Naked Island).

PROJECT IMPLEMENTATION

The USFWS is the most appropriate entity to conduct this project. The USFWS has conducted marine bird surveys and research in Prince William Sound, including studies of guillemots at Naked Island, since the 1970's, and is therefore well qualified to conduct this study. Barge transport of field equipment from Whittier to Naked Island, and hydrocarbon analysis are the only aspects of this project considered appropriate for contract bidding.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is integrally related to the NOAA forage fish project (No. 94163), and a proposed study of prey energetics that will be conducted via NOAA's Broad Agency Assessment (BAA). The forage fish project will assess the abundance of forage fish in key foraging areas, while the energetics project will provide information on the effects on guillemots of their feeding on prey of varied energetic values. Data from the present study, and the proposed kittiwake and puffin studies, will provide a three-pronged approach to addressing the question of food limitations on marine bird population recovery.

The guillemot project will share a field camp with some of the personnel from the proposed marbled murrelet, kittiwake, and puffin studies. Transport of equipment, communications with Anchorage, and data collection will be shared among these three projects. A coordinated effort among all the projects is expected throughout the lives of these biologically related studies.

FY 95 BUDGET ($K)

Personnel	232.0
Travel	11.0
Contractual	85.0
Commodities	15.0
Equipment	25.0
Subtotal	368.0
Gen. Admin.	40.8
Total	408.8

Investigating and Monitoring Oil Related Egg and Alevin Mortalities (Field Study)

Project Number:	95191A
Restoration Category:	Research (continuation of 94191)
Proposed By:	ADFG
Cooperating Agency:	NOAA
Cost FY 95:	$265,000 (includes $68,400 for data analysis and report writing of FY 94 work)
Cost FY 96:	$324,900
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon

INTRODUCTION

Each year approximately one half billion wild pink salmon fry emerge from the streams of Prince William Sound (PWS) and migrate seaward. Adult returns of wild pink salmon to PWS average from 10-15 million fish annually. These huge outmigrations of wild pink salmon and subsequent adult returns play a major role in the PWS ecosystem. Both juveniles and adults are important sources of food for many fish, birds, and mammals. Adults returning from the high seas also convey needed nutrients and minerals from the marine ecosystem to estuaries, freshwater streams, and terrestrial ecosystems. Wild pink salmon also play a major role in the economy of PWS because of their contribution to commercial, sport, and subsistence fisheries in the area.

Up to 75% of pink salmon spawning in PWS occurs in intertidal areas. In the spring of 1989 oil from the *T/V Exxon Valdez* oil spill (EVOS) was deposited in layers of varying thickness in intertidal portions of many western PWS streams utilized by spawning salmon. Pink salmon eggs and fry rearing in these intertidal areas appear to have been adversely affected by the oil. Salmon egg mortalities were 67%, 51%, 96%, 79%, and 59% higher in oiled streams than in comparable and nearby unoiled streams in 1989, 1990, 1991, 1992, and 1993, respectively. Differences between oiled and unoiled streams in 1989 and 1990 were confined to intertidal spawning areas and may be attributed to direct lethal effects of oil. Large differences observed

across all tide zones in 1991 and 1992 may be the consequence of damage to germ cells of the adults which originated from the 1989 and 1990 brood years when egg and larval exposures to intertidal oil were greatest. A consequence of this genetic damage may be persistent functional sterility and reduced returns per spawner for populations from oiled streams.

The proposed damage assessment and resource monitoring study is a continuation of past EVOS Trustee Council funded work conducted by the Alaska Department of Fish and Game (ADFG) and the National Marine Fisheries Service (NMFS). It will consist of field and laboratory studies conducted in western PWS and additional laboratory studies at the NMFS Research facility at Little Port Walter in southeastern Alaska. Results of the project will direct future restoration efforts for pink salmon and may impact future harvest management strategies in PWS fisheries.

The project will continue to monitor egg mortalities in the oiled and unoiled wild pink salmon streams previously studied, examine stream characteristics unrelated to oiling which may partially or completely explain the observed differences in egg mortality, and provide a laboratory evaluation of the 1989 and 1990 field results. The laboratory evaluation will also test the hypothesis that oil contamination during incubation can result in functional sterilization.

NEED FOR THE PROJECT

Information gained from this study will provide resource managers insight to the magnitude and persistence of damages sustained by wild pink salmon due to EVOS. Efforts to restore damaged pink salmon populations depend upon the fishery manager's abilities to identify sources of reduced survival and to monitor their persistence. Information on the potential of long term oil exposures to cause genetic damage is needed so spawning escapement goals can be reevaluated and adjusted if necessary. In addition, verification of the genetic hypothesis would provide the first evidence that reproductive capacity of fish exposed to chronic or acute sources of oil pollution would be compromised.

PROJECT DESIGN

A. Objectives

Component A - Recovery Monitoring of Injury to Pink Salmon Embryos in PWS

1. Estimate the density, by tide zone, of embryos in 31 streams using numbers of live and dead eggs and fry.

2. Estimate mortality of pink salmon embryos in both oil contaminated and unoiled (reference) streams.

3. Assess any loss in adult production from changes in embryo mortality using results of past NRDA studies.

Component B - Evaluation of Injury to Pink Salmon Gametes in PWS

1. Determine whether the increased pink salmon embryo mortalities observed in oil contaminated streams in 1989, 1990, 1991, 1992 and 1993 can be attributed to the physical characteristics of study streams.

Component C - Laboratory Evaluation of Injury to Pink Salmon Embryos and Preemergent Fry Exposed to Oiled Incubation Substrate

1. Determine survival, genetic damage, hydrocarbon uptake, mixed function oxidase activity, and sublethal teratogenic effects from long term exposures to oil in eggs exposed from fertilization to emergence.

2. Determine growth characteristics from each exposure group from juvenile stage to maturity.

3. Assess whether differences exist among exposure groups with respect to fecundity, fertilization rate, genetic damage, and sub-lethal teratogenic effects in the second generation progeny through swim-up.

Combining Field Observations and Laboratory Results

1. Determine in the elevated embryo mortalities in 1989 and 1990 were potentially caused by oil in the environment.

2. Determine if the elevated embryo mortalities in oil contaminated streams in 1991 and 1992 were potentially caused by genetic damage to 1989 and 1990 embryos.

B. Methods

Component A - Recovery Monitoring of Injury to Pink Salmon Eggs and Preemergent Fry in PWS

A systematic sampling program stratified by stream and tide zone will be used to collect egg, embryo density and survival data from 10 oil contaminated and 15 reference sites sampled previously in NRDA Fish/Shellfish Study 2, Restoration Science Study R60C, and Restoration Science Study 93003. Sampling will consist of embryo sampling conducted in late September and early October. Egg and embryo data will be summarized by date, stream, level of hydrocarbon impact, and stream zone. Density estimates will be used to assess adult spawning

success. Relative numbers of live and dead embryos will be used to test for continued reductions in survival in oil contaminated streams.

Component B - Evaluation of Injury to Pink Salmon Gametes in Prince William Sound

This project will continue to monitor the incubation of the Intra-stream crosses made during Restoration Science Study 93003. Embryos from the crosses will be incubated through hatching in a controlled laboratory environment. Egg mortalities will be compared for all crosses. Crossing results will be compared to results from field studies to determine the effect of stream characteristics on egg mortality differences previously observed between oiled and unoiled sites.

Component C - Laboratory Evaluation of Injury to Pink Salmon Eggs and Preemergent Fry Exposed to Oiled Incubation Substrate

This project will evaluate the degree of damage to embryos incubating in oiled substrate and determine the subsequent effects on fertility. Incubating pink salmon embryos will be exposed to oiled gravel in incubators from fertilization to emergence. Surviving fry will be grown to maturity and crossed with partners incubated under the same dose of oil. Relationships between dosage and fertility will be observed in addition to relationships between dosage and developmental success.

Finally, the screening for petro-chemical induced microlesions and macrolesions will be completed on individuals of known oiling history (including unoiled controls). Emphasis will shift away from flow cytometric analyses this project year to focus on the techniques of 1) haploid androgenesis and 2) DNA sequencing of rapidly evolving regions of DNA. A contractor will screen for deleterious recessive mutations (recessives are to be expected in the tetraploid-derived genome) using haploid androgenesis. Peer reviewers have recommended that we use a PCR-based approach to sequence the control region of mtDNA to maximize the probability of detecting genetic damage. Other regions of DNA will be targeted based upon the results of the control-region screen.

C. Schedule

Component A:	
Oct 1-15 1994	In stream embryo sampling
Oct 30-Dec 30 1994	Analysis of embryo data and completion of FY 93 final report
Component B:	
Oct 1-Nov 15 1994	Monitor incubators and collect data
Nov 15 1994-Jan 30 1995	Analyze data and prepare annual report

Component C: Time Period	1992 Brood Year	1993 Brood Year
1 Sept 94 - 15 Apr 95	Incubate F1	Culture in netpens
15 Apr - 1 Sept 95	Analyze incubation data from F1, prepare report	Spawn mature adults
1 Sept 95 - 15 Apr 96	N/A	Incubate F1
15 Apr - 1 Aug 96		Analyze incubation data, prepare final report

D. Technical Support

The project biometrician will ensure that the study design will provide a reasonable chance of reaching a defendable conclusion. A DNA technician will ensure proper tissue collection and preparation procedures, operate the flow cytometer, and perform sequencing. Gary Thorgaard, Washington State University, will provide the laboratory and technical expertise to perform the androgenetic screen. A chemist is required to establish a dosing protocol, determine hydrocarbon concentrations, and evaluate results of hydrocarbon analysis. Contracts will be required for histopathological and mixed-function oxidase work. It is essential that the results of this controlled experimentation be consistent with the results gathered under NRDA.

E. Location

Component A. All embryo and preemergent fry monitoring will take place in Prince William Sound.

Component B The experiment designed to evaluate the effects of environment on egg mortality will collect gametes from streams in Western Prince William Sound and incubate the resulting embryos at the Armin F. Koernig hatchery in Prince William Sound.

Component C. The experiment designed to test the effects of oil contaminated incubation substrate on gamete viability will be performed at the National Marine fisheries Service Laboratory at Little Port Walter, Baranof Island, southeastern Alaska.

Work dealing with the assessment of genetic damage will be performed in the Genetics Laboratory at the Regional Fish and Game Office in Anchorage unless performed by Washington State University under contract.

PROJECT IMPLEMENTATION

This will be a joint project between ADFG and NMFS. ADFG will be the lead agency for overall program management and genetic damage determinations. ADFG will be responsible for field monitoring, gamete fertilization, and incubation in Components A and B. NMFS will be responsible for oil exposures, chemistries, fish culture, and hydrocarbon end points in Component C. Both agencies will have statistical analyses responsibilities, particularly with the experimental designs. Both agencies will have joint responsibilities for meshing the lab and field results to reach a conclusion in the study. ADFG and NMFS have both successfully completed their responsibilities for this project in prior years and their results have been reported in a thorough and timely manner.

The ADFG is the logical agency to conduct Components A (field monitoring) and B (evaluation of injury to gametes) of this project. They have a statutory obligation to manage Alaska's wild salmon resources and have conducted field monitoring studies of embryos and pre-emergent fry since 1961 as part of their pink and chum salmon forecasting program. They also have a long history of experimental fish culture in PWS, they have a highly qualified group of geneticists on staff in a well equipped genetics laboratory, and their biometrics staff is particularly suited to analyzing applied fisheries data.

The facilities and staff of the NMFS make this the logical agency to conduct Component C of this study. The Auke Bay Laboratory and Little Port Walter field station personnel have extensive experience with fish related hydrocarbon dose response experiments, hydrocarbon chemical analyses, and culturing salmon from embryos to mature adults. The experimental incubation system is already in place for a dose response experiment at Little Port Walter and the pen rearing set up which NMFS currently uses to rear chinook to the mature adult stage at that facility are equally well suited to pink salmon.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The foundations for this project date back to the original NRDA F/S Study 2 (Injury to Salmon Eggs and Preemergent Fry). NRDA F/S Study 2 was equivalent to the field monitoring portion of this project (Component A) and was conducted in 1989, 1990, and 1991. The same project was continued as Restoration Study R60C in 1992. Two additional elements (Components B and C) were added to Restoration Study R60C during the summer of 1992. These additions were designed to assess the genetic damage hypotheses raised through NRDA F/S Study 2. All three components were present in the 1993 project, Restoration Study 93003. This project, 95191, is the continuation of work started in Restoration Study R60C and continued in Restoration Study 93003.

Several past NRDA and present restoration projects have been and continue to be intimately related to this project. The 1989 and 1990 NRDA F/S Study 4 demonstrated reduced growth and survival for salmon which reared in oiled areas. NRDA F/S Study 1 in 1989, 1990, and 1991 and subsequent Restoration Study R60B in 1992, investigated oil damage to adult pink

salmon spawning populations and provided valuable improvements in escapement estimation procedures used by fisheries managers to monitor and protect injured wild pink salmon populations. NRDA F/S Study 3 in 1989, 1990, and 1991 and subsequent Restoration studies R60A in 1992 and 93185 in 1993 provided hatchery and wild catch contribution estimates. This information was used by fisheries managers to reduce fisheries exploitation rates on injured wild pink salmon and also provided survival estimates for groups of fish examined by NRDA Study 4. The 1989, 1990, and 1991 NRDA F/S Study 28 and a subsequent Restoration study in 1992 incorporated data from all the previous studies into life history and run reconstruction models. These models were used to extrapolate losses in adult pink salmon production from injuries observed in earlier life history stages.

The field data collection for Component A of this project is very specific to individual wild pink salmon streams and precedes or follows most field activities of the PWS Sound Ecosystem Assessment program (SEA) and other pink salmon related projects consequently extensive coordination of field activities is not feasible. However, the vessel used by this project does collect physical and biological oceanographic data for the ADFG, PWSAC, and University of Alaska Cooperative Fisheries and Oceanographic Study and these data will be utilized by several SEA studies.

The field portion of Component B includes streams that are also listed for sampling by the proposed pink salmon genetics study. Tissue samples from carcasses of fish sacrificed for eggs and sperm in these streams will be collected for genetic analyses.

Component C of this project occurs at Little Port Walter on Baranof Island in Southeast Alaska and there is little opportunity for coordination with other projects with respect to data collection.

Final edited data from all three components of this project will be stored electronically as computer databases and final versions will be provided annually to the Information Modeling portion of SEA for incorporation into a centralized ecosystem database.

FY 95 BUDGET ($K)

Personnel	178.6
Travel	12.4
Contractual	26.6
Commodities	14.7
Equipment	4.0
Subtotal	236.3
Gen. Admin.	28.7
Total	265.0

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Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)

Project Number:	95191B
Restoration Category:	Research (continuation of 94191)
Proposed By:	NOAA
Cost FY 95:	$331,000 (includes $165,400 for data analysis and report writing on FY 94 work)
Cost FY 96:	$133,500
Total Cost:	$464,500
Duration:	2 years
Geographic Area:	Little Port Walter, Alaska
Injured Resource/Service:	Pink salmon

INTRODUCTION

The purpose of this study is to provide laboratory verification of the pink salmon egg mortalities from field observations presented by Sharr et al, and test the hypothesis that exposure of pink salmon eggs/alevins to an oiled incubation habitat will result in the functional sterilization of these animals at sexual maturity. This study, currently underway, utilizes controlled laboratory oil exposures to fertilized eggs in a simulated intertidal gravel environment in order to mimic environmental exposures of 1989 and 1990 (link to NRDA Study FS2). Measurements of survival, abnormalities, growth and hydrocarbon uptake will be made during exposure and rearing to sexual maturity, but the most important observation is the evaluation of gamete viability by crossing fish once they have matured.

Pink salmon were affected by the oil spill in 1989, at several life stages. Impacts to eggs, alevins, and fry were measured. With the crash of stock abundance in 1993, there was elevated concern for the long lasting effects of oil exposure, and if exposure to oil would create long lasting effects that would impact recovery. Genetic damage after oil exposures has not been observed in other oil spills, but the unique life history of intertidal spawning provides a long term oil exposure (eight months) to the developing eggs and larva. The observations of

elevated egg mortalities in oiled intertidal streams long after the spill (1990 through 1993) suggest that long lasting effects, no longer from direct oil exposure, may be occurring. The 1993 ADFG experiment that measured elevated egg mortalities from oiled streams in spawn removed to a hatchery environment (where the environment is the same for each stock) gives the long lasting effects hypotheses more credence.

This is a continuing project that was started in 1992 with the spawning of the 1992 brood year, and was repeated with the 1993 brood. This project should continue through the spawning of the 1992 brood in 1994, and the spawning of the 1993 brood in 1995, with an evaluation of the progeny viability and survival through hatch in 1996.

NEED FOR THE PROJECT

Information gained from this study will provide resource managers insight to the magnitude and persistence of damages sustained by wild pink salmon due to EVOS. Efforts to restore damaged pink salmon populations depend upon the fishery manager's abilities to identify sources of reduced survival and to monitor their persistence. Information on the potential of long term oil exposures to cause genetic damage is needed so spawning escapement goals can be reevaluated and adjusted if necessary. In addition, verification of the genetic hypothesis would provide the first evidence that reproductive capacity of fish exposed to chronic or acute sources of oil pollution would be compromised.

PROJECT DESIGN

The functional sterility hypothesis of Sharr et al. will be evaluated by crossing mature fish with known oil exposure histories. Fertilized pink salmon eggs will be incubated in oiled gravel, and the surviving fry will be reared to maturity. Mature fish exposed to oiled gravel as eggs/larvae will be crossed and the effects of oiled incubation substrate on gamete viability and offspring survival will be examined. If incubating in oiled gravel is shown to deleteriously affect gamete viability or offspring survival, then the plausibility of the functional sterility hypothesis will be established. This experiment will take place over two brood year cycles, starting in 1992 and ending in 1996 when the evaluations are completed.

A. Objectives

1. 1992 brood: Spawning of the 92 brood should occur in Sept 1994, or possibly October 1994. Adults will be examined for dose related differences in marine survival (net pens), growth, fecundity, and fertility. The spawn will be incubated in separate family groups for evaluation of survival and abnormalities through hatching.

2. 1993 brood: Juvenile fish will be cultured through the winter until sexual maturity in September or October of 1995. Dose related effects on growth, and overwinter marine survival will be evaluated.

3. Complete biological and chemical analyses of the oil exposure phases for both brood years. Integrate biological observations, chemical analyses, and contracted measurements into reports and manuscripts on the impacts through emergence.

B. Methods

This experiment began with a controlled oil exposure/gravel incubation simulation of an intertidal spawning environment. Fertilized eggs from brood years 1992 and 1993 were placed on oiled substrate and incubated to emergence. Several oil doses were utilized in both exposures. Biological responses (e.g. survival, timing of emergence, growth, size, hydrocarbon loads) to the oiled substrate were evaluated during the incubation period for both brood years, and will be updated in 1994. The surviving fry are currently being cultured to maturity and their gametes will be collected, crossed and incubated in a clean environment. Adults from the 1992 brood will mature in September 1994. Differences in gamete fertilization rates and embryo survival will be attributed to different oil exposures in the parental generation beginning in November 1994. Fish from the 1993 brood will mature in September 1995, and similar evaluations will follow.

C. Schedule

1992 Brood Year - Periods to Complete Tasks

Jul 15 - Sep 15 1992	Oil gravel, set up incubators
Sep 15 1992 - Sep 15 1993	Spawn pink salmon, and culture fry.
Sep 15, 1993	Write first interim report
Sep 15, 1993 - Sep 15 1994	Culture tagged fish in netpens spawn second generation.
Sep 15 1994	Write second interim report
Sep 15 1994 - May 15 1995	Incubate second generation,
May 15 - Aug 15 1995	Analyze and integrate data collected from culture of 1992 pink salmon and their progeny.
Sep 15 1995	Write third interim report

1993 Brood Year - Periods to Complete Tasks

Jul 15 - Sep 15 1993	Oil gravel, set up incubators
Sep 15 1993 - Sep 15 1994	Spawn pink salmon, culture fry.
Sep 15, 1994	Write second interim report
Sep 15, 1994 - Sep 15 1995	Culture tagged fish in netpens spawn second generation.
Sep 15 1995	Write third interim report
Sep 15 1995 - May 15 1996	Incubate second generation.
May 15 - Aug 15 1996	Analyze and integrate data collected from culture of 1993 pink salmon and their progeny.
Aug 15 - Sep 15 1996	Write final report

D. Technical Support

NMFS Auke Bay Laboratory will provide all laboratory facilities for fish culture, hydrocarbon

analyses, and computer facilities for data analysis and management. Histopathology and MFO contracts were let on the 1992 brood samples. ADFG genetics staff are conducting the genetics analyses (aberrations) on the lab samples provided by us and on the PWS field samples provided by the field component of ADFG. ADFG statisticians/biologists have been involved in the design and implementation of the crosses.

E. Location

Project will take place at Little Port Walter, located on Baranof Island in southeastern Alaska, using nearby intertidal stocks.

PROJECT IMPLEMENTATION

This project is currently underway at the NMFS research facility at Little Port Walter, and is managed by Auke Bay Lab.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is a component of Restoration Study 94191, a cooperative project between NMFS and ADFG. Previously implemented contracts have involved the University of California, Davis and the Woods Hole Oceanographic Institute.

FY 95 BUDGET ($K)

Personnel	213.7
Travel	32.5
Contractual	0.0
Commodities	45.7
Equipment	7.0
Subtotal	298.9
Gen. Admin.	32.1
Total	331.0

Harbor Seal and Sea Otter Cooperative Population and Harvest Assessment

Project Number:	95244
Restoration Category:	General Restoration (continuation of 94244)
Proposed By:	ADFG
Cost FY 95:	$89,900
Cost FY 96:	$22,100
Total Cost:	$112,000
Duration:	2 years
Geographic Area:	Prince William Sound and Lower Kenai Peninsula
Injured Resource/Service:	Subsistence

INTRODUCTION

The goal of the project is to work cooperatively with subsistence hunters to assess the impact of subsistence harvests of harbor seals and sea otters, and other factors, on the recovery of these species, and to identify ways to reduce these impacts. This project began in FY 94 (Project Number 94244). The work plan for FY 94 called for a summary of subsistence harvest data, collection of traditional knowledge about these populations, and compilation of biological data. To reach the project goals described in the FY 94 restoration work plan, we propose to continue this project into FY 95 to 1) complete compilation all of the available information; 2) gather additional data as needed; 3) analyze and interpret the data, in cooperation with the appropriate agencies and native groups; and 4) if necessary, produce a set of recommendations regarding harbor seal and sea otter harvesting to guide subsistence users who want to voluntarily change their harvesting practices to help these two species recover. Added to the set of objectives is an informational program, either in a slide or video format, that can be used to inform the public, including subsistence users, about the current status and trends in harbor seal and sea otter populations.

NEED FOR THE PROJECT

The populations of harbor seals and sea otters in Prince William Sound and adjacent waters were injured as a result of the *Exxon Valdez* oil spill. The U. S. Fish and Wildlife Service estimates that between 3,500 and 5,500 sea otters were killed by oil in the first months after the spill, and sea otters were still being injured by oil in the environment three years later. The

case for a population level oil spill injury to harbor seals is less clear. Harbor seal populations throughout the Gulf of Alaska are known to have been in decline before the oil spill. This decline has continued, but it is difficult to determine how much, if any; of it is due to the effects of oil in the environment. However, it is known that harbor seals were exposed to *Exxon Valdez* crude oil in Prince William Sound. They suffered some direct mortality although the number of harbor seals killed is unknown. Harbor seals also suffered sub-lethal effects, including corneal damage, nerve damage, and brain lesions.

Many subsistence hunters within the spill area, concerned about the decline they have observed in the numbers of harbor seals and sea otters, have voluntarily reduced their take of these species in an effort to help their recovery. However, at present, there is no mechanism in place to evaluate the effectiveness of these efforts.

Some data are available on marine mammal harvests in the spill area and are being summarized for the first year of the project. The Division of Subsistence, Alaska Department of Fish and Game has collected information on the numbers of harbor seals and sea otters harvested by subsistence users living in several communities in the spill region for both pre-and post-spill years. In 1993, the Division of Subsistence, in cooperation with the National Marine Fisheries Service and Ruralcap, also undertook a project to collect more detailed information on the timing and composition of subsistence harvests of harbor seals and sea lions (but not sea otters), including figures for those animals struck and lost. This project will continue into FY 95. The U.S. Fish and Wildlife Service runs a sea otter tagging program, which gathers information on sea otter harvests, including the location where animals are taken.

There is also some information available on harbor seal and sea otter populations in the region. The Division of Wildlife Conservation, Alaska Department of Fish and Game, working with the National Marine Fisheries Service has conducted a count of harbor seals in both the oiled and unoiled areas of Prince William Sound, along with other research aimed at assessing the health of the harbor seals (restoration project number 93046). The U.S. Fish and Wildlife Service has continued to monitor the recovery of sea otters in oiled areas, by determining their abundance, distribution and mortality (restoration project number 93043).

This project constitutes a step towards involving subsistence hunters in the resource management process, and may lead to an on-going exchange of information and consensus building with regard to the management of harbor seals.

PROJECT DESCRIPTION

A. Objectives

Project objectives include: a compilation of available data on harbor seal and sea otter populations and trends; conducting a meeting of marine mammal biologists and subsistence users to evaluate and discuss the data; production of an informational program, either in a slide format or a video, which can be used as an educational tool about harbor seal and sea otter

populations and trends; production of a set of recommendations for subsistence users of harbor seals and sea otters based upon study findings and workshop results; and harvest location data to supplement that collected in 1994.

B. Methods

The project will involve compiling information from a variety of sources. Sea otter tagging data collected by the U.S. Fish and Wildlife Service will be used to estimate both the number of sea otters taken, and the locations in which they were hunted. The Division of Subsistence is administering a survey (funded by the National Marine Fisheries Service) in the oil spill impacted communities to gather information on the numbers of harbor seals harvested, including a breakdown by life stage and sex of the animal, and an estimate of the number struck and lost. It is anticipated that this project will continue. A section will be added to the questionnaire on location of harvest for this species. Information collected by the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service on the biology and population characteristics of harbor seals and sea otters in the oil spill impact area will also be used. In 1994, the Division planned to enter into a cooperative agreement with the Alaska Sea Otter Commission to assist in the interpretation of the biological and population data, and the potential effects of the harvest on the health of the populations, as such interpretation is outside of our expertise.

Following the compilation and analysis of the data, an ad hoc committee would be convened to evaluate the accumulated information and make recommendations to subsistence users. Such a committee would be composed of representatives of appropriate agencies, including the Alaska Department of Fish and Game, the US Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration, and native organizations, including the Alaska Sea Otter Commission, Ruralcap, the Chugach Regional Resources Commission, and the village and traditional councils of the area. Recommendations of the ad hoc group would be presented to subsistence users both in an informational newsletter, and in community meetings. Any changes to the harvest would be voluntary, as the ad hoc group would have no authority to compel any changes. Following this meeting, additional workshops in communities would occur to summarize and discuss the findings. Additional data collection for harvests taking place in late 1994 and 1995 would take place.

Ideally, the recommendations of the ad hoc group should become part of the harbor seal recovery plan.

C. Schedule

All work will be conducted in FY 95.

D. Technical Support

The project will not require any technical support as defined in the instructions for this document.

E. Location

The study area will include Prince William Sound and the lower Kenai Peninsula. Primary marine mammal hunting communities in this area include Cordova, Tatitlek, Chenega Bay, Nanwalek, Seldovia, and Port Graham. Hunters in other communities, such as Valdez and Homer, will also be included in the project.

PROGRAM IMPLEMENTATION

This project will take advantage of several existing programs, both within the Alaska Department of Fish and Game and other agencies. These other programs are described above. The Division of Subsistence will need to contract out for someone to assist in the analysis and interpretation of the biological and population data. This kind of work is outside the expertise of the staff of the Division of Subsistence, and the Division of Wildlife Conservation will not have any personnel available for this task. We would prefer to continue the co-operative agreement with the Alaska Sea Otter Commission for this service, because their ties to the Alaska Native communities and their experience with these issues will be of benefit to the project. There will also be a need for a second contract to produce the informational program.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will incorporate information on the numbers, distribution and degree of recovery of the populations of harbor seals and sea otters from restoration projects 94064 (Harbor Seal Habitat Use and Monitoring) and 94246 (Sea Otter Recovery Monitoring Project). It will also provide information on seal and sea otter harvest in Prince William Sound and the Lower Kenai Peninsula to help the marine mammal researchers to evaluate the impacts, if any of the harvest on the recovery of those populations.

FY 95 BUDGET ($K)

Personnel	52.7
Travel	15.0
Contractual	12.0
Commodities	1.5
Equipment	0.0
Subtotal	81.2
Gen. Admin.	8.7
Total	89.9

Kenai River Sockeye Salmon Restoration

Project Number:	95255
Restoration Category:	General Restoration (continuation of 94255)
Proposed By:	ADFG
Cost FY 95:	$645,000 (includes $373,800 for data analysis and report writing of FY 94 work)
Cost FY 96:	$614,000
Total Cost:	$1,259,000
Duration:	2 years
Geographic Area:	Upper Cook Inlet
Injured Resource/Service:	Sockeye salmon and commercial fishing

INTRODUCTION

Sockeye salmon *(Oncorhynchus nerka)* which spawn in the Kenai River system were injured by the *Exxon Valdez* oil spill (EVOS). Greatly reduced fishing time in Upper Cook Inlet (UCI) due to EVOS caused sockeye salmon spawning escapement levels in the Kenai River to exceed that desired by three times. The biological impact of EVOS on Kenai River sockeye salmon stocks may be one of the most serious documented. Data collected by NRDA Fish/Shellfish Study 27, Sockeye Salmon Overescapement, indicated greatly reduced survival of juvenile sockeye salmon during the winter-spring rearing period beginning with the 1989 parent year. The extremely high escapement may have initially produced more rearing juvenile sockeye salmon than could be supported by nursery lake productivity. In general, when rearing salmon abundance greatly exceeds lake carrying capacity, the species and size composition of prey resources are altered which affects all trophic levels. Because of such changes, juvenile sockeye growth is reduced, freshwater mortality is increased, greater proportions of fry remain in the lake for another year of rearing, and smolt condition is reduced and marine mortality is increased. Limiting sockeye salmon fry production by closely regulating the number of spawning adults may be the only way to restore the productivity of these rearing areas. Sockeye smolt outmigrations in the Kenai River were severely reduced in 1991 (1989 parent year) and continued to decline through 1993. The number of adult sockeye salmon returning from the 1989 overescapement in the Kenai River is expected to be low. Starting in 1994, a reduction of Kenai River sockeye salmon harvests may be necessary to ensure adequate escapements.

NEED FOR THE PROJECT

Sockeye salmon harvested from the mixed-stock fishery of Cook Inlet include fish from the Kenai, Kasilof, and Susitna Rivers. In order to effectively manage the harvest of EVOS-damaged stocks, Restoration Science Studies R53/R59/93012/93015/94255 were implemented in 1992 and 1993. This proposal is the continuation of those projects through fiscal 1995. These studies use Genetic Stock Identification (GSI) techniques to identify Kenai River stocks in mixtures within the Kenai River itself and within Cook Inlet marine areas. Area managers will use this information to estimate relative abundances and modify fishery management to protect the EVOS-damaged Kenai River stocks. In addition, genetic information from Kenai River stocks is critical in the planning of many restoration options currently under consideration for the Kenai River.

GSI techniques rely on genetic variation to discriminate between populations of organisms. This method has proven to be extremely effective for allocating and adjusting the harvest of fish stocks intercepted in mixed-stock fisheries such as those that occur in Cook Inlet. Once a data base has been established, GSI techniques should provide an ongoing mechanism for in-season management. This will allow managers to control the harvest of Kenai River sockeye salmon and facilitate their recovery.

A comprehensive allozyme genetic database has been developed with collections originating from over 36 populations of sockeye salmon from the Kenai, Kasilof, and Susitna drainages as well as western Cook Inlet. Significant genetic heterogeneity has been detected not only among major regions, but also within the larger drainages. Extensive numerical analyses are being conducted to evaluate the identifiable genetic units and to test the accuracy and precision of the resulting classification model. Analyses to date indicate that although many stocks can be identified with a high level of precision, the very large spawning aggregations in the mainstem of the Kenai River require additional baseline genetic information.

A pilot fishery study was conducted during 1993 using allozyme data. Stock proportions from two fishery samplings were estimated using the genetic baseline collected during the 1992 field season. In both cases the laboratory and statistical analysis were completed within 48 hours. Routine fishery monitoring in-season can begin once the GSI model has been adequately refined and evaluated.

PROJECT DESIGN

A. Objectives

The goal of this project is to restore Kenai River sockeye salmon injured by the oil spill. This will be accomplished through improved stock assessment capabilities, more accurate regulation of spawning levels, and modification of human use. The specific objectives are to:

1. Obtain baseline allozyme genetic data (during 1992-1995) from all significant spawning

stocks contributing to mixed-stock harvests of sockeye salmon in Cook Inlet.

2. Use Genetic Stock Identification (GSI) algorithms to estimate the relative proportion of Kenai River stocks within the mainstem Kenai River and in marine mixed stock fisheries of Cook Inlet. Estimates will be made from adult, smolt, and fry samples. These data will allow managers to estimate relative abundances and genetic relatedness of Kenai River stocks to aid in restoration planning and to allow managers to modify area and time of harvest.

3. Investigate the added utility of DNA-level markers to discriminate among Cook Inlet populations.

4. Provide more accurate estimates of abundance of Kenai River sockeye salmon within Cook Inlet through hydroacoustic assessment techniques.

B. Methods

Stock Identification

Over the last two years we have developed a comprehensive genetic database of sockeye salmon stocks in Cook Inlet. In 1992 we collected baseline genetic data using allozyme analyses from 28 subpopulations from Cook Inlet including the Kenai, Kasilof, and Susitna Rivers. The majority of these were resampled in 1993 along with an additional eight populations. During 1994 we will focus our efforts in two areas: 1) refining and evaluating the model, and 2) applying the resulting model to freshwater and marine mixed stock analyses.

We proposed to refine our characterization of the large spawning aggregations within the Kenai River and to complete collections for several other Cook Inlet systems inadequately sampled in the preceding years. Target sample sizes for allozyme baseline collections will be 100 individuals to adequately characterize spawning populations. We will also analyze freshwater mixed stock samples to examine the accuracy and precision of the GSI model. Approximately 200 sockeye salmon each will be collected at least twice from fishwheels operating at the Kenai River, Kasilof, and Crescent escapement enumeration sites during the summer of 1994. A composite sample with individuals from throughout Cook Inlet will be constructed and analyzed "blind" by the genetics laboratory.

The resulting GSI model will be applied to both freshwater and marine mixed stock samples. Mixed stock samples of adult sockeye salmon will be collected from selected drift fisheries openings occurring during the July fisheries (maximum of two; 1995-1996). Sample sizes will be set at 400 to minimize the confidence intervals surrounding the estimates. Fishery composition estimates will be available within 48 hours following the fishery so that management decisions can be based on the actual composition of the fisheries. In addition, mixture samples from the Kenai River of outmigrating smolts and fry will be collected during Restoration Project 94258 to determine stock composition and provide information on production and rearing dynamics. Estimation of the relative contribution of the Russian River populations will be particularly valuable, as it is possible that the Russian River will be the major stock component within the

Kenai River in future years. Results to date indicate that the Russian River stock is genetically quite distinct and can be estimated with an accuracy greater than 0.90.

Muscle, liver, heart, and eye tissue will be taken from individual fish and examined by protein electrophoresis (allozyme analysis) for discriminating gene markers. Genotypic and allelic frequency estimates will be calculated from allozyme electrophoretic data for each baseline and mixed-stock sample at every gene locus examined and will be used to identify discrete spawning populations. Stock components of mixed fishery samples will be estimated using a conditional maximum likelihood algorithm.

We have also identified mitochondrial DNA (mtDNA) polymorphisms within Cook Inlet sockeye salmon populations that potentially could further discriminate among stocks. We will continue to collect these mtDNA markers from selected Cook Inlet populations. Total genomic DNA will be extracted and amplified through PCR (polymerase chain reaction) techniques utilizing various mitochondrial primers. Restriction analyses will be conducted, and maximum likelihood simulation studies will be performed to test the additional resolution that could be provided by the DNA-level data. DNA data will be collected from the fishery samples as scientifically and logistically feasible. We also propose to continue developmental work to identify additional nuclear DNA genetic markers through the competitive bid process.

Offshore Test Fish Program

The sockeye salmon total run to UCI has been estimated early during the season by test fishing between Anchor River and Red River delta. Northward migrating sockeye salmon are captured with a drift gill net at a series of stations. Salmon are identified to species and sex, and length measurements are recorded. Estimates of total sockeye salmon return are made several times during the season by estimating expected total test fishery catch per unit of effort for the season and catchability of sockeye salmon in the test fishery. Analysis of historical data has indicated that existing sampling effort and catch has not been proportional to abundance. To assess run size more accurately, additional sampling effort will be added to the existing program.

In 1992 and 1993 hydroacoustic equipment and techniques were tested in UCI offshore waters. Results of this work indicated that hydroacoustic techniques could detect salmon and provide a population estimate for "in season" management use. However, the primary limitations identified in the study were limitations (signal/noise ratio) of the hydroacoustic gear due to rough sea conditions or shallow water in the northern portion of UCI. In 1993, 12 orthogonal transects sampled over 48 hours within Cook Inlet provided a useable estimate of adult salmon abundance. In addition to this effort the vessel and hydroacoustic gear was deployed for six days in conjunction with the existing ADFG test fish vessel at Anchor Point. Estimates of salmon abundance were correlated with test fish catches under calm weather conditions and development of a program to estimate sockeye salmon hydroacoustic targets is encouraging.

C. Schedule

Finish baseline sample collection	October, 1994
Laboratory analyses of 1994 baseline & mixture samples	October, 1994 - March, 1995
Prepare, advertise, and award contract for UCI hydroacoustic survey and DNA marker development	Jan. - April, 1995
Final report from hydroacoustic survey contractor, FY94	February, 1995
Draft status report for FY94	March, 1995
Numerical analyses of stock structure; modelling of 1994 fishery samples	March - Sept., 1995
Baseline sample collection; fry and smolt collections	March - Sept., 1995
Fishery sample collection and in-season analysis	June - July, 1995
Hydroacoustic assessment	July, 1995
Final status report for FY94	Sept., 1995
Numerical analyses of stock structure	Sept., 1995 - Feb., 1996
Final report from hydroacoustic survey and DNA contractors	Feb., 1996
Draft status report for FY95	March, 1996
Final status report for FY95	Sept., 1996

D. Technical Support

Administrative support is provided by the Administrative, Habitat, and Commercial Fisheries Development and Management Divisions staff of the Alaska Department of Fish and Game. The project leaders are fully funded with general funds from the State of Alaska. Project assistants are fully or partially funded by this project. Laboratory support is provided by the ADFG Genetics Program which includes facilities for tissue archival, allozyme analysis, PCR-based and other DNA analyses, and data analyses. These studies are integrated with ongoing studies by the Commercial Fisheries Division for efficiency in completing the objectives.

E. Location

Upper Cook Inlet, north of a line from Anchor point to the Red River Delta. Field work will be inlet wide and based out of Soldotna; lab work and a portion of the data analyses will be conducted in Anchorage.

PROJECT IMPLEMENTATION

The allozyme and mtDNA data collection and all data analyses will be conducted by the Alaska Department of Fish and Game. Continued research and development of DNA markers will be accomplished through contractors chosen through the competitive bid process (value not to exceed $20,000).

A sole source contract is proposed (value not to exceed $50,000) to be awarded to *BioSonics Inc.* for continuing work in UCI with hydroacoustic equipment. *BioSonics Inc.* has been awarded the contract since 1992 through competitive bid procedures. The experience gained and the recent purchase of *BioSonics Inc* equipment for this project make them the logical contractor for the continuation of these studies.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Field efforts for this project are coordinated with Restoration Project 94258 (Kenai River Overescapement), and the collection of fry and smolt samples is organized between the two projects. DNA analyses for this project are integrated with those of projects 94320D (population genetics of pink salmon) and project 94191 (study of oil-related embryo mortalities in Prince William Sound pink salmon).

FY 95 BUDGET ($K)

Personnel	382.4
Travel	17.3
Contractual	101.1
Commodities	58.8
Equipment	21.0
Subtotal	580.6
Gen. Admin.	64.4
Total	645.0

Sockeye Salmon Overescapement

Project Number:	95258
Restoration Category:	Monitoring (continuation of 94258)
Proposed By:	ADFG
Cooperating Agency:	DOI
Cost FY 95:	$998,100 (includes $337,800 for data analysis and report writing of FY 94 work)
Cost FY 96:	$845,300
Total Cost:	Unknown
Duration:	Studies will continue until observed effects recover to pre-spill conditions
Geographic Area:	Kodiak Island and the Kenai Peninsula
Injured Resource/Service:	Sockeye salmon and commercial fishing

INTRODUCTION

This study is a continuation of the oil spill damage assessment program initiated in 1990. The continuing program reflects modifications based on the FY93 study results. Recommendations provided by an international review team of sockeye salmon experts provided at a March 15, 1993 meeting at Vancouver, B.C. have been incorporated.

Commercial fishing for sockeye salmon in 1989 was curtailed in upper Cook Inlet, the outer Chignik districts, and the Kodiak areas due to presence of oil in the fishing areas from the EVOS. As a result, the number of sockeye salmon entering four important sockeye producing systems (Kenai/Skilak, Chignik/Black, Red, and Frazer Lakes) and two less important lake systems (Akalura and Afognak or Litnik lakes) greatly exceeded levels that are thought to be most productive. Sockeye salmon spawn in lake associated river systems. Adult salmon serve an extremely important role in the ecosystem, providing food for marine mammals, terrestrial mammals, and birds. Additionally, carcass decomposition serves to charge fresh water lake systems with important nutrients. Juvenile salmon which rear in lakes for one or two years serve as a food source for a variety of fish and mammals. Sockeye salmon are also an important subsistence, sport, and commercial species. The ex-vessel value of the commercial

catch of sockeye from these lake systems has averaged about $42 million per year since 1979, with the 1988 catch worth $115 million. Sockeye salmon returns to the Kenai River system support some of the largest recreational fisheries in the state.

Overly large spawning escapements may result in poor returns by producing more rearing juvenile sockeye than can be supported by the nursery lake's productivity. In general, when rearing fish abundance greatly exceeds the lake's carrying capacity, prey resources are altered by changes in species and size composition with concomitant effects on all trophic levels. Because of such changes, juvenile sockeye growth is reduced, mortality increases, larger percentages holdover for another year of rearing; and the poor quality of smolts increases marine mortality. Where escapements are two to three times normal levels, the resulting high juvenile densities crop the prey resources to the extent that more than one year is required to return to normal productivity. Rearing juveniles from subsequent brood-years suffer from both the poor quality of forage and from the increased competition for food by holdover juveniles. This is the brood-year interaction underlying cyclic variation in the year class strength of anadromous fish.

This project continues examining the effects of large 1989 spawning escapements on the resulting progeny and associated foraging habitat for a select subset of the above mentioned sockeye nursery lakes. Three impacted lake systems where the 1989 escapements were more than twice the desired levels (Kenai/Skilak in Upper CI; Red and Akalura lakes on Kodiak Island) were selected. Beginning in 1994, Frazer Lake has been used for future comparisons of a system receiving normal escapement. Because this lake has undergone detailed study in the past and has continued funding from other sources, minimal funding is necessary to provide for data collection to insure comparisons with Akalura and Red lakes. Similarly, Tustumena Lake on the Kenai Peninsula received normal escapements and is used as a control for the Kenai River systems. This lake differs primarily in the increased natural turbidity levels and a history of modest stocking of sockeye salmon fry.

Schmidt and Tarbox report the results through 1992 on these ongoing investigations. In addition, the study proposal reflects results of data collected in the spring of 1993. These studies suggest continued poor smolt production from the Kenai River, despite normal smolt production from Tustumena Lake, the control for this system. The 1992 and 1993 (preliminary) data indicate Red Lake zooplankton communities and nutrient levels have recovered to the level measured in 1986, prior to the oil spill. Smolt numbers appear to be lagging but adult forecasts for returns in 1994 suggest escapement goals will be met; therefore, management actions will be used as the primary method for restoration. Smolt numbers will be used to forecast future returns and provide assistance to managers in future harvest management decisions. Akalura Lake demonstrated poor zooplankton densities with low smolt numbers. The 1994 adult run is not expected to meet escapement requirements. A restoration plan for Akalura lake will be produced during the winter of 1993-94 based on analysis of data collected to date.

The 1993 smolting information from the Kenai system lakes indicate poor smolt production. In addition, the Russian River smolt project indicated very poor production, suggesting this system may also be below production expectations. This system was first identified as having suspect

production when the 1992 smolt count from the lower Kenai failed to produce sufficient numbers of age two smolt to account for historic Russian River smolt migrations. This project suggests further investigations into the Russian River are warranted.

NEED FOR THE PROJECT

The proposed studies will provide the needed data to determine the most appropriate action for recovery of these ecosystems. The monitoring of fry and smolt from the systems provide a response variable by which natural recovery through return to normal escapements can be monitored. The nutrient status, water chemistry, physical data, and the temporal and spatial distribution of the zooplankton community provide the necessary data to determine the effects of natural climatic variation, as well as response to changes in sockeye salmon densities. These data are essential to determine the type of future activities that may be required to restore the system. A pilot research/restoration project is proposed separately to examine the feasibility of more interventive types of restoration. The recent workshop on the development of restoration strategies found that this research and monitoring effort received a high priority.

PROJECT DESIGN

The studies are located on Kodiak Island and the Kenai Peninsula. Recent findings have suggested major economic damage to commercial, subsistence, and sport fisheries may result because of the over-escapement event associated with the fisheries closures on the Kenai River sockeye salmon stocks caused by the 1989 oil spill. Smolt numbers emigrating from the Kenai River in the spring of 1992 and 1993 were less than one-fiftieth the numbers estimated in 1989. This suggests a likely possibility of future returns below existing escapement goals. Red River smolt numbers from the 1989 escapement on Kodiak Island are estimated to return at rates which will provide for minimal commercial harvests if average marine survival occurs.

In addition to monitoring the damage extent, the mechanism that lead to the collapse requires definition. These studies essentially follow the pattern established in the original 1990 study plan but with significant modifications to accommodate recent findings.

A. Objectives

The following objectives are altered based on input from peer reviewers of the 1992 progress report and proposed revisions to the 1994 study program.

1. Estimate critical biological attributes (number, age, size) of both resident and migrant juvenile sockeye in overescaped and normal escaped sockeye salmon nursery lakes of the Kenai Peninsula and Kodiak Island.

2. Determine effects on smolt production and subsequent adult returns caused by large escapements resulting from fishery closures after the EVOS. These effects will be inferred by studying the changes in the rearing capacity of selected nursery lakes which were either affected or unaffected by the oil spill. Data used for these inferences include:
   a. age and growth of juveniles and smolts,
   b. nursery area nutrient budgets and plankton populations,
   c. seasonal, diel, and vertical distribution of zooplankton species which are the known prey of sockeye salmon in Skilak, Kenai, and Tustumena Lake; and
   d. seasonally available zooplankton biomass in these lakes and the relationship of this biomass to ambient temperature and light.

3. Develop a pilot research project to determine experimentally the cause of the decline and potential restorative actions. ADFG in cooperation with the regional research staff of the U.S. Fish and Wildlife Service and the Refuge staff of the Kenai National Wildlife Refuge has developed a pilot research project to further define the mechanism of sockeye salmon decline and determine the feasibility of alternative restoration opportunities. This is submitted separately but depends on data obtained through these investigations.

B. Methods

From the inception, these investigations have used an ecosystem approach to determine factors limiting the recovery of the affected sockeye salmon population.

Numbers of adult sockeye salmon that entered selected spawning systems outside PWS prior to and during 1989 have been estimated at weir stations or by sonar. This information was collected during projects routinely conducted by the ADFG as part of their resource management program. Optimal escapement levels, which on the average should produce maximum sustained yield, have been based on either past relationships between spawners and returning progeny or the extent of available spawning and rearing habitat. The baseline program will continue at each site including but not limited to estimates of adult sockeye escapement and collection of scales for age analysis.

For each of the lake systems identified, the response (abundance, growth, and freshwater age) of rearing juveniles will be studied. Because of the significance and magnitude of the findings on Red Lake, and on Skilak/Kenai lakes, these studies will continue until observed effects on growth and the limnetic community of the lake ecosystems recovers to pre-spill conditions.

The total number of juvenile sockeye in the Kenai Peninsula lakes will be estimated through hydroacoustic surveys conducted during all years up until recovery of the system is observed. Age and size information will be obtained from samples of juvenile sockeye collected from concurrent mid-water trawl netting surveys. Survey transect designs for hydroacoustic sampling and tow-netting have been established for Kenai and Skilak lakes and Tustumena Lake. Depending on densities of rearing juvenile sockeye salmon, estimates of fish densities will be made for each transect either by echo integration or by echo counting. Total fish population estimates will be computed, by summing transect populations, along with 95% confidence intervals. Additional studies of the vertical distribution of Skilak Lake sockeye will be conducted simultaneously with population estimates with an additional sampling period, for vertical sampling only, in November 1993.

Freshwater growth and age of sockeye salmon rearing juveniles from all study systems will be determined from scale and possibly otolith measurements made either by direct visual analysis of scales or using an Optical Pattern Recognition system. In cases where data are available (e.g., Kenai and Skilak Lakes and Tustumena Lake), growth of progeny from the 1989 spawning escapements will be compared with growth or size of progeny during prior years.

The total number of smolt migrating from each system will be estimated with a mark-recapture study using inclined plane traps after Kyle and King et al. Smolt will be captured in traps, sampled for age and size information, marked with Bismark Brown Y (a biological dye), and transported upstream of the traps and released for subsequent recapture. Periodic retesting will determine the capture efficiency of the traps under changing river conditions during the spring. Total population estimates (with 95% confidence intervals) will be made using catch efficiencies, and weekly number weighted smolt size and age information will be calculated using a computer spreadsheet developed by Rawson. Smolt programs consistent with those for the study lakes are continuing for Tustumena Lake.

On the Kenai River, the smolt operation will require expansion to include the Russian River. This lake system apparently now is the dominant producer of sockeye salmon smolt and is upriver from the current smolt project on the mainstem Kenai River. To determine the production of smolt from the Kenai River mainstem, estimates of smolt production from the Russian River lake system must be completed to separate normal Russian River production from the smolt production of sockeye salmon rearing in Skilak and Kenai lakes. These methods are being established to insure current projections of smolt production from the Kenai River lake systems are not an artifact of some unknown sampling bias.

In 1993 we fished one trap in the Russian River to estimate the smolt migration. We caught few fish (less than 5000) and the catch rate was 5%. In 1994, increased trap catch rates will be required to insure we are not missing fish in this clear water system.

The current length frequency data on sockeye smolts at the Kenai mainstem river smolt traps indicates that we may be missing a portion of the Russian River smolt outmigration. With the excellent genetic separation of Russian River sockeye from mainstem Kenai fish we should be able to separate these two components in the catch. This will allow for a better total smolt estimate and verification of the Russian River smolt trap data.

The smolt data for 1993 indicated that the Russian River lake systems may be experiencing similar declines in production as the mainstem Kenai River. The 1989 escapement into this system was 138,000 adults, which is far in excess of the minimum 30,000 goal. Therefore, to evaluate the current production potential and impacts of large escapements, limnological and fry hydroacoustic/tow net surveys of the Russian lakes are proposed. Techniques duplicate those used on other systems.

In the two Kenai Peninsula lakes, early spring and late fall sampling of fry will be conducted. The reason for the additional sampling period is that approximately 50% of the weight gain from fry to smolt in the Kenai River system occurs outside of the current sampling regime. If poor survival is occurring because of limitations in rearing habitat quality during this period, these data are crucial for determining the validity of fry density causing decreased over-wintering survival. Based on peer review comments, hydro-acoustic studies of fry abundance will be conducted into Fall 1994 to track and sample the juvenile fish until cold weather prevents further studies. This is based on the assumption that most of the density dependent mortality occurs in early winter.

Studies on Kodiak Island will be reduced because of recent findings. These include elimination of the smolt weir counts on Red River; relying on mark/recapture studies with smolt traps will be used to estimate smolt abundance in 1994. In 1992 the hydro-acoustic surveys were eliminated on these lakes because of interference of stickleback with the population estimates. Samples of fall fry for age, weight, and length will continue to be collected. The variation and differences in Upper Station lakes suggest this system is inadequate as a control for Red Lake and Akalura Lake. Therefore, Frazer lake will be used as a control in the future. Monitoring of this system is primarily conducted by general fund expenditures of the Alaska Department of Fish and Game. A minor modification will be made to the program to insure compatibility with the monitoring continuing on Akalaura and Red lakes. Funding from these studies will be used to augment the regular smolt monitoring program. A second inclined plane trap will be used to ensure that adequate samples are obtained for more accurately describing smolt population numbers and AWL characteristics to insure similar precision with the Red and Akalura lakes studies. The continued poor smolt production in the spring of 1993 (600,000 Red Lake, 90,000 Akalura Lake) suggest continued monitoring of these systems is warranted.

Limnological data will be collected to monitor the response of the lakes to high juvenile rearing densities and their recovery once escapement levels decline. Table 1 provides a time-line of these studies and reflects the integration with the fisheries investigations previously discussed. These data will be used to estimate carrying capacity parameters of euphotic volume, nutrient budgets (carcass enrichment), and zooplankton biomass, body-sizes, and composition shifts. Approximately six limnology surveys will be conducted at two or more stations, to determine zooplankton species abundance and body-sizes, nutrient chemistry, and phytoplankton abundance for Kenai/Skilak, Tustumena, Red, and Frazer lakes. Methods for limnological studies are detailed in Koenings et al.

In cases where seasonal data are available (i.e. Kenai and Skilak lakes), limnological parameters taken during residence of the juveniles from the 1989 spawning escapements will be compared to parameters within these systems during prior years.

The holistic approach proposed here involves several evaluation procedures to assess the effects of sockeye salmon overescapement. First, fresh-water production from the 1989 escapements will be assessed in Kenai/Skilak, Red, and Akalura lakes. This will be accomplished through analysis of growth, freshwater survival (in particular over-winter survival), and freshwater age of sockeye smolt populations. Any anomalies will be determined by analysis of freshwater growth recorded on archived scales, historical freshwater age composition, and modelled freshwater survivals; and from results of previous studies as well as the smolt characteristics from each of the study systems. Also, planktonic food sources will be assessed through estimation of zooplankton prey biomass and diversity of species. Some of these analyses have been completed.

Although in the Kenai River system smolt enumerations and fall fry estimates during 1991, 1992 and the spring of 1993 produced very low numbers, zooplankton biomass estimates in Skilak Lake, the major sockeye salmon producer, have not undergone similar levels of decline. Limited stomach samples evaluated recently from 1987 indicate a possible major switch in diet, further supporting limited food availability as a likely factor in the decline. Further investigation into plankton availability and growth rates following the methods of Schmidt and Tarbox will continue.

Experimental and empirical sockeye life history/production models will be used to compare salmon production by life-stage at escapement levels consistent with management goals to the 1989 escapements. These models will be refined by use of food availability data obtained through the vertical sampling studies initiated in 1992 and to be continued through 1995.

Additionally, in the case of the Kenai system, the 1989 escapement effects will be viewed independently of the effects on previous brood years with high escapement.

Consult Schmidt and Tarbox for further discussion of analyses and methods used to date in progress reports on these investigations.

C. Schedule

The timeline of the 1995 studies is outlined on Table 1. This table depicts the sampling schedule for the integrated limnological studies and fisheries studies on the Kenai Peninsula and Kodiak Island.

D. Technical Support

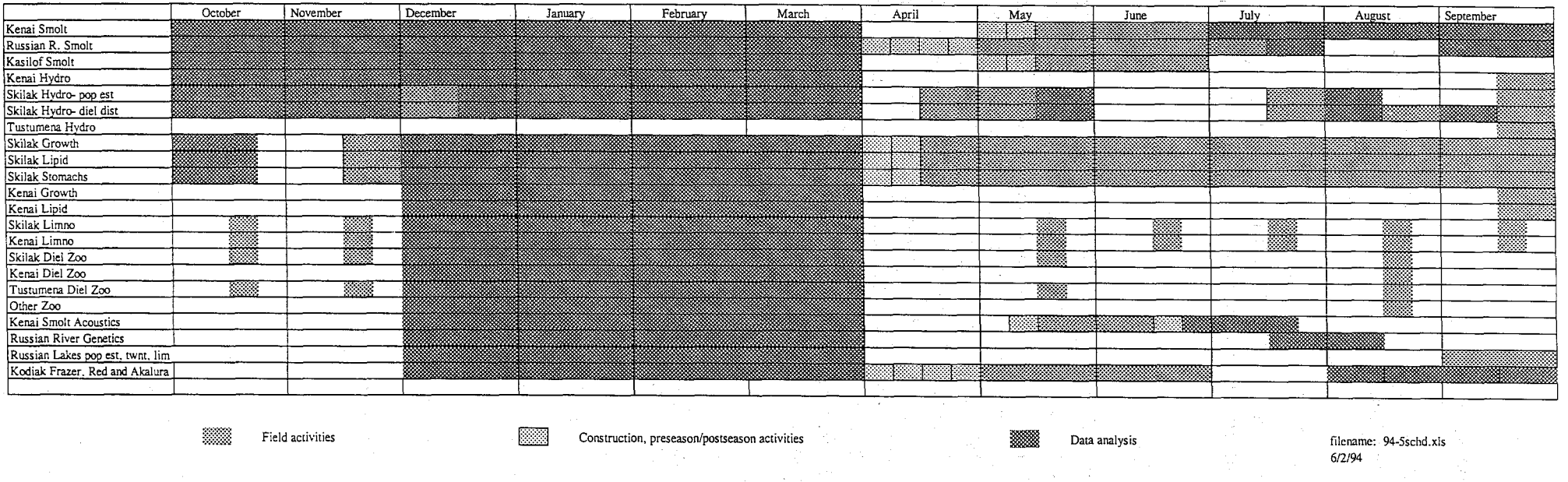
Administrative support is provided by the Administrative Division, Habitat Division, and Commercial Fisheries Management and Development Division staff of the Alaska Department of Fish and Game. The project leaders and their assistants are not funded by this project and are supported with general funds from the State of Alaska. Most laboratory analyses are conducted by the limnology laboratory in Soldotna. These studies are integrated with ongoing studies by the Commercial Fisheries Management and Development Division on Kodiak Island and the Kenai Peninsula. These studies have different objectives, i.e. to manage, enhance, and rehabilitate common property salmon fisheries, but use the same techniques and data collection methods. Consequently the EVOS investigations have been integrated into the normal operations of these Divisions for efficiency in completing the objectives of these studies and the general mission of these agencies.

E. Location

Study locations are on Kodiak Island and the Kenai Peninsula. Specific sampling locations are identified in Schmidt and Tarbox (1993).

Table 1. 1994-95 work schedule.

NRDA STUDIES- OCTOBER 1994-SEPTEMBER 1995



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PROJECT IMPLEMENTATION

The projects have been implemented in the past through the Alaska Department of Fish and Game. Considerable infrastructure was established and the programs are dovetailed into existing agency programs to insure cost effectiveness. Although continuation of the projects could be completed by any public or private organization with the proper expertise, the Trustees need to weigh the effectiveness of such a process with the disruption of the existing program.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The Alaska Department of Fish and Game has ongoing commercial fisheries research operations on the Kenai and Kasilof River, Frazer Lake, Red River, Akalura Lake, Upper Station Lake, and Afognak Lake. In addition, the Division has ongoing data collection activities from Hidden, Karluk, and Spiridon lakes relating to the limnology of these systems. These data are integrated into statewide or regional data bases that are use to directly assess the impacts of the oil spill or are used as controls to measure the response of the studies proposed in this plan, against. In addition, the area research and management biologists for the Division of Commercial Fisheries management and development, the principal limnologist, the regional limnologist, and numerous administrative and support staff are supported by general funds provided by the Alaska legislature. To date, most of the data analysis and reporting for the Sockeye Salmon Over-escapement project has been provided from State general funds. Total funding for these programs exceeds $1 million.

The studies proposed provide for data collection and field sampling programs. As such no environmental effect will occur beyond that of traditional fisheries management data collection activities. All activities will be within existing collecting permits or Federal special use permits issued to the Department of Fish and Game for scientific data collection activities. New programs on the National Wildlife Refuge are updated through permit amendments as needed. No other permits or other coordination activities are involved.

The investigations of Kodiak and Kenai River sockeye salmon have been integrated with long term research efforts by the Alaska Department of Fish and Game on these stocks. In addition, studies by the limnology laboratory and the fisheries development staff on Kodiak Island on these systems are included in data analysis. Study design and methodology builds off of earlier efforts. Planning and permitting of research activities and future rehabilitation efforts are coordinated through the USFWS Refuge staff in Soldotna and on Kodiak Island. Consultation and planning is conducted with the newly formed National Biological Survey Fisheries Research Laboratory staff in Anchorage. Restoration strategies on the Kenai Peninsula will be developed through a review process with the regional planning teams. An ADFG review committee, including the Sport Fish Division, will be involved when adjustments of management policies, such as escapement goals, are made. In addition, study results from the Coghill Sockeye Salmon investigations in Prince William Sound are reviewed and integrated into the data analysis process for determining the response of the Kenai Peninsula ecosystem to restoration measures.

FY 95 BUDGET ($K)

Personnel	694.7
Travel	13.3
Contractual	76.9
Commodities	63.6
Equipment	40.0
Subtotal	888.5
Gen. Admin.	109.6
Total	998.1

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Prince William Sound Shoreline Restoration

Project Number:	95266
Restoration Category:	General Restoration (continuation of 94266)
Proposed By:	Various members of the public
Lead Trustee Agency:	ADEC
Cooperating Agencies:	NOAA, DOI
FY 95 Cost:	$1,411,100 (includes $97,900 for sample analysis, data analysis and report writing for FY 94 field work)
FY 96 Cost:	$68,800
Total Cost:	$1,480,000
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Harlequin ducks, black oystercatchers, juvenile otters, subsistence, recreation and tourism, and intertidal and subtidal organisms

INTRODUCTION

The 1993 and 1994 shoreline assessments (projects 93038 and 94266) resulted in the identification of beach segments where residual shoreline oil may still be influencing recovery of resources and services, but that are difficult to cost-effectively and safely restore using currently available proven technology. In addition, through project 94090, mussel beds were identified with residual, often unweathered, oil that are also difficult to cost-effectively and safely restore.

This project would allow the Alaska Department of Environmental Conservation, in cooperation with the other Trustee Agencies, to competitively solicit private sector companies to remove oil from contaminated shorelines and mussel beds that are not recovering as quickly as desirable. The use of new, innovative methods to safely and cost-effectively restore the beaches would be encouraged. This project also would fund sample analysis, data analysis and report writing for field work carried out in 1994 as part of project 94266.

This project is proposed to respond to: 1) requests from the public (especially Chenega Bay) for additional restoration work on the beaches, and 2) proposals from private sector companies that have approached the Trustee Council and ADEC with technologies and cleaning techniques to restore oiled shoreline areas that are not responding well to natural recovery. Rather than sole-source a single method, this project allows a competitive analysis of any methods that may be available.

The presence of substantial levels of petroleum hydrocarbons persisting under dense mussel beds in Prince William Sound and the Gulf of Alaska provides a continuing source for oil to enter the food chain, potentially impacting higher consumers, especially harlequin ducks, oystercatchers, juvenile otters, and humans. There is a possible link between the presence of oiled mussels and the disruption of reproduction in harlequin ducks and increased mortality in oystercatcher chicks.

The presence and removal of residual shoreline oil is important for subsistence, recreation, sediments, mussels, and intertidal and subtidal organisms. It is also relevant to harlequin ducks, sea otters, and other injured species that feed in the intertidal area. In addition, while oil itself is not an injured resource or service, it is the cause of the injuries.

NEED FOR THE PROJECT

The oil on the beaches in the spill area is disappearing through microbial degradation, photo-oxidation, mechanical abrasion and other means. The oil on most beaches is noticeably disappearing over time. There are about a dozen beaches where natural recovery is proceeding at a very slow rate. These beaches have recently been listed by EPA and ADEC as impaired under the auspices of the Clean Water Act. There are another approximately twelve beaches that are not much better. These same beaches were difficult to deal with during the cleanup. Treatment of these beaches in the past was expensive and would probably be so in the future. The difficult question that the Trustee Council needs to address is whether an expenditure of funds for treatment to accelerate recovery of these oiled beaches is an appropriate expenditure given other restoration needs.

Shoreline Oil. The results of previous shoreline assessments have demonstrated that surface oil in the spill area has become very stable and is showing little sign of degradation. The Trustee Council authorized a project in 1994 to treat some beaches with hard surface asphalt deposits. The asphalt is broken up into very small particles that are much more susceptible to degradation by microbes and photo-oxidation. That method is much less effective on the surface oil deposits that are hard on the outside and still a gooey liquid on the inside. Some of these deposits are up to 20 cm thick.

Between 1991 and 1993, subsurface oil at comparable sites in Prince William Sound decreased on average by about one half. Still, at some sites (approximately 12) there has been little reduction in subsurface oil. These sites are primarily in low energy areas so that recovery is not aided by wave action. Most of the beaches are either heavily rock armored or have large

boulders or both. The oil is often between or under large rocks. The beaches were heavily oiled by the spill and the oil is usually in the form of a gooey brown emulsification of oil and water (mousse). The worst sites still sheen. On average, the sites are approximately one quarter to one half mile long by 50 to 75 yards wide. Most of the oil is in the high-intertidal area with small amounts in the mid-intertidal area. Very little oil is in the low-intertidal area.

Contaminated Mussel Beds. Residual subsurface oil presents a harmful set of problems where mussel beds exist in low wave energy areas. Most of the cleanup effort in 1989 through 1991 avoided the protected mussel beds since mussels are an important food source for a variety of organisms including sea otters and birds. The byssal mats and the layer(s) of mussels themselves protect the oil in an anaerobic environment and retard natural weathering and cleaning. Microbial degradation proceeds very slowly in an oxygen free environment. There appears to be slow remobilization of the oil from the sediments to the mussels, which likely provides a continuing source of oil contamination in Prince William Sound. The oiled mussels continue to be a probable route of oil exposure to higher level predators such as sea otters, harlequin ducks, and black oystercatchers — resources that have not yet begun to recover from the spill. This continuing exposure is expected to significantly delay recovery from the spill in some predators, for example in harlequin ducks. Although the oiled mussel beds are relatively few in number, since they occur in protected areas and since animals and birds tend to feed in protected areas, especially during storms, it seems likely that the oiled mussel beds are a more important source of contamination to higher trophic level organisms than would initially be indicated by the number of remaining oiled mussel beds.

Approximately 70 mussel beds were surveyed this summer in Prince William Sound as a part of project 94090. About 15 are being cleaned. The primary method for cleaning contaminated mussel beds in project 94090 will be a procedure that removes and replaces the oiled sediments from under the beds with little harm to the mussels. This procedure evolved from minimally intrusive site manipulations conducted in 1992 and 1993 by NOAA. However, that method cannot be used with all of the important and contaminated mussel beds in western Prince William Sound. Another method must be found to cleanse the approximately 15 known substantially oiled beds that remain. Most of the remaining mussel beds are characterized by large rocks. Often there is no close source of replacement sediments.

Discussion with residents, especially from Chenega Bay; interviews with recreational users; and comments from the general public indicate that in some locations the remaining oil has important social and economic consequences. Chenega residents have been adamantly unsatisfied with the oiled condition of several clusters of beaches regardless of the technical difficulties involved in further treatment. Some of the Chenega-area sites contain some of the most persistence, heavy and medium oil residual concentrations found in the spill area. While these sites probably will continue to improve over a long time, this does not appear to be acceptable to the people of Chenega Bay, who hunt and fish and beachcomb in the area adjacent to their village on a day-to-day basis. They have expressed continuing interest in accelerating the improvement through treatment of some kind.

PROJECT DESIGN

A. Objectives

1. Demonstrate safe, cost-effective methods for cleaning beaches and mussel beds of residual oil.

2. Restore 3-5 beaches or mussel beds which have unacceptable concentrations of residual oil.

3. Solicit private sector competition and innovation to provide access to safe, cost-effective technology not currently used by Trustee Agencies that could be used to restore other oiled beaches as appropriate.

B. Methods

1. Select the beaches and mussel beds proposed for restoration. Develop a description of each beach and bed. Most of this work has already been done as a part of previous shoreline assessments, ongoing conversations with Chenega Bay residents and recreation user groups, and agency scientists. However, agency scientists and Chenega Bay residents will be involved in the location decisions to ensure that the locations chosen for restoration are the most appropriate for their ecological value and value to subsistence and recreation users.

2. Develop a Request for Proposal to Solicit Private Contractors to restore the beach segments and mussel beds. Evaluation criteria must be developed for the RFP such as the importance of price, the apparent technical feasibility, the potential benefit and harm to the environment that may result from the proposed methods, the likelihood of success, and the Contractor's past performance. Development of the criteria will be done in cooperation with the other Trustee Agencies and the Chief Scientist.

3. Distribute RFP; choose Contractor; administer Contract.

4. Develop a monitoring program to determine the degree of success of oil removal and the effects on the environment. Development of the monitoring program will be done in cooperation with the other Trustee Agencies and the Chief Scientist.

5. Conduct monitoring program before and after beach treatment.

6. Write final report.

C. Schedule

November-February 1994	Develop beach segment list, RFP, evaluation criteria, and monitoring program
March 1994	Issue RFP
May 1994	Select contractor(s)
June-August 1994	Administer contract(s), monitor sites
April 1995	Draft final report

D. Technical Support

Hydrocarbon sample analysis and mussel monitoring will be conducted by NOAA's Auke Bay Laboratory. Other monitoring components will be carried out by the appropriate entities which will be determined once agreement is reached on the monitoring program.

E. Location

Prince William Sound

PROJECT IMPLEMENTATION

The major part of this project will be implemented through a competitive solicitation (RFP).

COORDINATION OF INTEGRATED RESEARCH EFFORT

This is general restoration, not a research project. Thus, coordination is for the most part field coordination with other activities in the area.

FY 95 BUDGET ($K)

The estimated costs are based upon proposals ADEC has received in the past to restore oiled beaches using alternative methods. This budget assume 3 beaches would be treated with different methods by different contractors at a cost of $300,000 per beach and $200,000 for the monitoring program. The cost per beach treatment should go down if more than one beach were treated with the same method. If, in response to the RFP, the cost per beach is less, either more beaches can be treated, more methods can be tried or funds can be returned to the Trust. Some of the beaches could be mechanically treated with heavy equipment to move rocks and sediment to expose the oil as was done during the cleanup in 1990. That may or may not be cheaper on a unit basis depending upon what is received in response to the RFP. Mechanical treatment would not work well on some of the beaches which was demonstrated during the cleanup. Also, a determination would have to be made whether mechanical treatment on a given beach would do more harm than good. The cost of the monitoring program is an estimate and may be less once it is further developed by the Agencies and the Chief Scientist.

Personnel	153.6
Travel	14.1
Contractual	1166.4
Commodities	8.0
Equipment	9.5
Subtotal	1351.6
Gen. Admin.	59.5
Total	1411.1

Chenega Chinook Release Program

Project Number:	95272
Restoration Category:	General Restoration (continuation of 94272)
Proposed By:	Prince William Sound Aquaculture Corporation
Lead Trustee Agency:	ADFG
Cost FY 95:	$47,200
Cost FY 96:	$47,200
Total Cost:	$94,400
Duration:	2 years
Geographic Area:	Crab Bay near the Chenega village on Evans Island in PWS
Injured Resource/Service:	Subsistence

INTRODUCTION

In June 1994, PWSAC began a chinook salmon smolt release program at Crab Bay adjacent to the village of Chenega Bay in cooperation with the Alaska Department of Fish and Game (ADFG) and the residents of Chenega Bay, to establish local salmon runs to restore damaged resources resulting from the *Exxon Valdez* oil spill in 1989. Funding for this project was provided through the EVOS Trustee Council.

The FY95 proposed Chenega chinook salmon smolt release project will continue the 50,000 smolt release program initiated in 1994. This program is planned to eventually result in a return of adult chinook salmon to Crab Bay reaching a projected 2,000 salmon.

NEED FOR THE PROJECT

This project will provide for the replacement of salmon and other marine resources damaged by the EVOS. The residents of the Chenega village and local commercial and sports fisherman will be the principle beneficiaries of this project because of their proximity to the proposed release site.

PROJECT DESIGN

A. Objectives

1. Rear and release 50,000 Wally Noerenberg Hatchery chinook salmon smolt in Crab Bay near the Chenega village on Evans Island beginning in Spring 1994.

2. Develop a return of 2,000 adult chinook beginning in 1998. At an average of 20 pounds per returning chinook, Chenega residents can expect to harvest 40,000 pounds of salmon annually. This projection is based on current fish culture criteria including marine survivals and growth.

B. Methods

Annually, 820,000 chinook salmon eggs are taken at PWSAC's Wally Noerenberg hatchery (WNH) on Esther Island. Brood stock are harvested from among adult chinook salmon returning to the hatchery. Following incubation, hatch and outmigration from incubator trays, chinook fry are reared in raceways at WNH for one year. Prior to release, chinook smolts are transferred to saltwater net pens at the hatchery or to remote release sites for a short period of saltwater rearing.

In the spring of 1994, 50,000 chinook smolt were taken from WNH and transported via barge and fry/smolt transport tanker to Crab Bay. This operation is proposed to continue in 1995. The smolt will be released into a 350 m^3 (40 ft X 40 ft X 5 ft) net pen anchored in Crab Bay. Smolts will be reared for approximately two to three weeks at the site for imprinting and additional growth prior to release. Technical support for the incubation, hatching and feeding of the smolts will be provided by PWSAC. Residents of Chenega village will be contracted, trained in smolt feeding and rearing, and paid for services.

C. Schedule

Activity	Begin	Complete
Rearing (smolt)	4/94	5/95
Outmigration (fry)	3/95	4/95
Install net pen	5/95	5/95
Feed and imprint smolt	5/95	6/95
Release smolts	6/95	6/95
Dismantle/Remove net pen	6/95	6/95
Eggtake	7/95	8/95
Incubation	8/95	3/96

D. Technical Support

Technical support for the project will be provided by PWSAC. Feeding at the release site will be accomplished by the residents of Chenega.

E. Location

The location for the release is in Crab Bay, located near the Chenega village on Evans Island in PWS.

PROJECT IMPLEMENTATION

PWSAC will implement the project; residents of Chenega will be contracted by PWSAC to feed the smolt rearing at Crab Bay.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is not proposed as research, but is a program directed at resource replacement.

FY 95 BUDGET ($K)

Personnel	6.0
Travel	0.0
Contractual	37.7
Commodities	0.0
Equipment	0.0
Subtotal	43.7
Gen. Admin.	3.5
Total	47.2

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Subsistence Food Safety Testing

Project Number:	95279
Restoration Category:	General Restoration (continuation of 94279)
Proposed By:	ADFG
Cooperating Agencies:	NOAA
Cost FY 95:	$241,600
Cost FY 96:	$51,500
Total Cost:	$293,100
Duration:	2 years
Geographic Area:	Prince William Sound, the Kenai Peninsula, and Kodiak Island
Injured Resource/Service:	Subsistence

INTRODUCTION

Subsistence uses of fish and other wildlife constitute a vital natural resource service that was injured by the *Exxon Valdez* oil spill. Data collected by the Alaska Department of Fish and Game's Division of Subsistence demonstrated this injury. Annual per capita subsistence harvests declined dramatically (from 4 percent to 77 percent decline compared to pre-spill averages) in ten of the communities in the path of the spill during the first year after the event. In subsequent years, levels of subsistence harvests, ranges of uses, harvest effort, and the sharing of resources have gradually increased in all of the spill area communities. Some subsistence users reported renewed confidence in traditional foods after receiving information and health advice from the Oil Spill Health Task Force. Others returned to using subsistence foods despite their misgivings because of economic and cultural reasons. Still others have traveled to unoiled areas to harvest resources. A view persists in the communities in the oil spill area, that the natural environment has changed in ways that still pose a potential threat to their health and their way of life. This view is partly fueled by observed abnormalities in resource species, and scarcity of some resources.

We propose to continue a subsistence restoration project involving the following communities; Chenega Bay, Tatitlek, Cordova, Valdez, Nanwalek, Port Graham, Seldovia, Kenai, Seward, Larsen Bay, Karluk, Old Harbor, Akhiok, Port Lions, Ouzinkie, Kodiak City, Chignik Lake, Chignik, and Chignik Lagoon.

In 1993 and 1994 the *Exxon Valdez* Trustee Council provided funding to restore the subsistence uses of fish and wildlife damaged by the *Exxon Valdez* Oil Spill. Community meetings were held in order to identify and map the specific areas and resources of continued concern to subsistence users. Samples of those subsistence species cited in community meetings as being of continued concern were collected from harvest areas identified during the mapping, with community representatives assisting in site selection, as well as the collection of samples. The samples were analyzed for the presence of hydrocarbon contamination, at the National Oceanic and Atmospheric Administration/National Marine Fisheries laboratory in Seattle. Community representatives were transported to the lab and given a tour of the facilities. The results of the tests, along with findings from other damage assessment and restoration studies, were interpreted by the Oil Spill Health Task Force, and reported to the communities in an informational newsletter and community visits.

At this point, there is little we can learn about subsistence food safety from additional hydrocarbon testing, and barring unforeseen circumstances, we will not be doing any further testing of this kind. The remaining samples will be analyzed by NOAA this winter; NOAA will provide a report of its hydrocarbon analysis in spring 1995. The 1995 project will continue efforts to communicate information on subsistence food safety to the communities, through the Subsistence Restoration Newsletter. The Newsletter will also be used to report information on other restoration projects, putting the information into context for subsistence users. In addition we will put in place a system for getting samples of abnormal resources from subsistence users to biologists and pathologists for study, and will report the findings of the scientists to subsistence users.

This project will assist the Trustee Council in making decisions concerning restoration, enhancement or replacement of lost subsistence resources and uses.

PROJECT DESCRIPTION

The goal of the project is to restore the subsistence uses of fish and wildlife damaged by the *Exxon Valdez* Oil Spill. It is expected that by responding to the specific oil spill related concerns of subsistence users through testing of those resources, and reporting accurate health information back to the affected communities in clear, understandable language and in one on one discussions, the confidence of subsistence users in the resource can be restored. Past efforts in this direction have been partially successful.

A. Objectives

This is anticipated to be the final year of a three year project. The following dates refer to the completion of activities for fiscal year 1995. Sampling kits will be in place in the communities by January 15, 1995, and the participating scientists will have been recruited by the same date. Four issues of the Subsistence Restoration Newsletter will be produced. The last round of community meetings will take place in September 1995.

B. Methods

Community meetings will be held in eleven communities (Chenega Bay, Tatitlek, Nanwalek, Port Graham, Seward, Larsen Bay, Karluk, Old Harbor, Akhiok, Port Lions, and Ouzinkie) to identify any continued oil spill related concerns of subsistence users. Other communities may be added if such concerns are noted by Subsistence Division researchers during community visits. Those communities where no concern is indicated in either the community meetings or by other communication will be dropped from the study.

A system will be put in place whereby subsistence users can send samples of abnormal resources that they encounter to biologists and pathologists to be examined. This will involve identifying, ahead of time, scientists willing to examine different types of specimens, and how each type of specimen needs to be handled, packaged and shipped. Community residents will need to be trained to properly preserve the different types of samples for shipping. Sampling kits will be placed in each community, and an account will be set up with an air carrier to transport samples from the communities to Anchorage. The training of subsistence users and the assembling of kits will be contracted out on a competitive basis. Reporting the information from the scientists to the subsistence users will be done by the Division of Subsistence.

Communication of health advice and information on restoration projects to residents of the impacted communities would require the production of a quarterly Subsistence Division newsletter. It is important that the findings of restoration studies be integrated into this communication effort. As this information is released it is likely to cause renewed concern among subsistence harvesters. It is not always possible to anticipate the effect a technical report, or the media accounts derived from it, will have in these communities. The newsletter will serve to put this information in context for subsistence users, following an evaluation of the information by the Oil Spill Health Task Force. It will also be important to follow distribution of the newsletter with community visits. These can involve informal visits to households and/or formal meetings. The purpose will be to further the dialogue between researchers and the communities regarding study findings.

By involving subsistence users in decisions affecting mitigation, and the monitoring, enhancement and replacement of the natural resources, we can accelerate the recovery of the resources subsistence users rely upon. There is a need in these communities to actively participate in restoration of the environment. This project provides for such involvement.

The training of subsistence users to collect samples and the assembling of collection kits will be contracted out on a competitive basis. Typesetting and printing of four issues of an informational newsletter will also be contracted out. These task involve specific skills, and can be more efficiently completed by a professional.

C. Schedule

January 1995	Informational newsletter issued, community meetings
March 1995	Training complete, kits in place in communities, scientists lined up
April 1995	Informational newsletter issued
July 1995	Informational newsletter issued
August 1995	Informational newsletter issued
April 1996	Final report on fiscal year 1994 activities

Throughout the duration of the project, there will be periodic village visits as appropriate, and samples will be processed as they come in.

D. Technical Support

Technical support will be needed from biologists and pathologists with various state and federal agencies. Some have already indicated their willingness to participate in such a project.

E. Location

Field work will be conducted on Prince William Sound, the Kenai Peninsula, and Kodiak Island. The communities of Chenega Bay, Tatitlek, Nanwalek, Port Graham, Seward, Larsen Bay, Karluk, Old Harbor, Akhiok, Port Lions, and Ouzinkie will be involved. Other communities may be added if similar concerns are identified.

FY 95 BUDGET ($K)

Personnel	130.9
Travel	21.5
Contractual	54.8
Commodities	13.3
Equipment	0.0
Subtotal	220.5
Gen. Admin.	21.1
Total	241.6

Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the *Exxon Valdez* Oil Spill

Project Number:	95290
Restoration Category:	Monitoring (continuation of 94290)
Proposed By:	NOAA
Cost FY 95:	$163,400 (includes $91,900 for data analysis and report writing on FY 94 work)
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	Ongoing project; data is interpreted and archived as it is received from other projects
Geographic Area:	Oil spill area
Injured Resource/Service:	Multiple resources

INTRODUCTION

The Auke Bay Laboratory (ABL) has provided data archival and interpretive services for environmental samples that have been collected and analyzed for hydrocarbons in support of the *Exxon Valdez* NRDA and restoration efforts. The samples derive from all projects, investigators, and agencies (including both State of Alaska and Federal agencies) that have collected samples for hydrocarbon analysis. The general purpose of this project is to make a large and complex hydrocarbon database available to principal investigators, resource managers, and the public by providing user friendly services. The hydrocarbon database contains sample collection and chemical analyses information from thousands of samples from 1989 to the present. Briefly the database contains:

1. Sample collection information for >41000 samples including major sample types of sediment, tissue, water, and oil.

2. Hydrocarbon analysis information for >12000 samples; each sample analyzed has results for 73 analytes plus quality assurance data.

3. Bile and HPLC analysis for >2400 samples.

4. Data in support of NRDA and restoration projects over the period 1989-1994.

This project will provide the following:

1. Continued use and access of 1989-94 NRDA and Restoration hydrocarbon data.

2. Expansion of the hydrocarbon database with new hydrocarbon and collection information for current Restoration studies collecting samples, requiring analysis and data archival.

3. Interpretation of past and current hydrocarbon results for PI's managers, and the public.

4. Continued quality control of sample storage, hydrocarbon analyses, and data archival.

Interpretive services include hydrocarbon data interpretation to identify probable sources of hydrocarbons found, evaluation of new hydrocarbon data for evidence of systematic bias, hydrocarbon data editing according to consistent criteria and hydrocarbon data mapping to facilitate identification of temporal and geographic trends of these data . The results of these efforts provide numerical correlates that are directly related to oil, and that may be used by PI's of other Restoration projects, by other governmental agencies, and by the general public, to assess associations of observed biological effects with concentrations of *Exxon Valdez* oil. These archival and interpretive services have been provided by staff at ABL for hydrocarbon samples generated for the *Exxon Valdez* NRDA effort, who have developed automated computer methods to insure that the various criteria are consistently applied to these data, and which result in computer-generated maps of the final results. The purpose of the presently proposed project is to integrate these additional data with the *Exxon Valdez* NRDA hydrocarbon database, and to continue to provide interpretive services, thereby insuring that hydrocarbon data resulting from Restoration efforts are directly and unequivocally comparable with the existing data. These services have been used extensively by various PI's in the production of interpreted final reports and manuscripts.

NEED FOR THE PROJECT

All restoration projects that collect samples for hydrocarbon analysis need archival of collection information, sample storage, and chemical analysis. In addition, they usually need interpretation support of the chemical analysis for reports. In many cases biologists are not qualified to interpret hydrocarbon results. Many restoration projects need access to hydrocarbon results and interpretations to make resource decisions and are benefited by these services. The Trustees and public are also benefited by permanent archiving of hydrocarbon sample collection and analytical results in a database.

PROJECT DESIGN

A. Objectives

The objective of this project is to apply and extend hydrocarbon interpretation methods and data archival developed in NRDA assessments to samples analyzed for the Restoration effort, and to insure the comparability of analytical and interpretive results with those of the NRDA effort.

B. Methods

Procedures developed during the NRDA effort will be followed in this project. Incoming samples are inventoried and collection information is entered into a database located at Auke Bay, Alaska. Hydrocarbon data will be evaluated using methods described in the final reports of *Exxon Valdez* NRDA project Subtidal #8. These methods were developed specifically for *Exxon Valdez* NRDA hydrocarbon data. Data associated with hydrocarbon samples will be added to the existing *Exxon Valdez* database. Principal investigators from all projects collecting hydrocarbon samples will be assisted by this project through archival, interpretation, and mapping of their data. Data archival will include maintenance of a Rbase database with sample collection information and hydrocarbon results. This database allows inventory of hydrocarbon sample collection, and retrieval of collection and hydrocarbon results for PI and management use. Rbase will be replaced with Oracle database to allow remote access to the data as needed. Data interpretation will include examination of the data for evidence of systematic bias, which will provide the basis for an evaluation of data quality, and a probability based determination of sources of hydrocarbons found in samples. Finally, maps of specific hydrocarbon samples will be provided on request by principal investigators, government agencies, or the general public.

C. Schedule

This project is an ongoing service task and therefore has few set milestone dates. All of the methods, including computer software written specifically for these tasks, have already been developed, tested, and applied. The requested funds are entirely for continuation of these services for additional data that will be produced by Restoration projects. Data is distributed to PI's and other interested parties as requested. Final reports will be completed in April of 1995 for 1994 activities and in April 1996 for 1995 efforts.

D. Technical Support

All technical support is on site. This includes hydrocarbon analytical facilities, computer services, database management and mapping services. The facility just acquired a CDC unix computer with Oracle database software that is connected on the internet with potential access of all users.

E. Location

The project will be undertaken at the Auke Bay Laboratory in Juneau, Alaska.

PROJECT IMPLEMENTATION

There are alternative agencies that could implement the project. These include State, University and private agencies that could be contracted to manage the database and provide chemical interpretive services. However, since ABL has established procedures, expertise, and equipment, costs would be higher and time for switching of the project would have to be accounted for. There are only a few places in the country that have the chemical expertise of Auke Bay.

COORDINATION OF INTEGRATED RESEARCH EFFORT

All PIs collecting samples for hydrocarbon analysis will be given materials and training to incorporate their samples into the database. We work closely with all PIs requesting interpretive or mapping services.

FY 95 BUDGET ($K)

Personnel	131.2
Travel	6.0
Contractual	0.0
Commodities	6.5
Equipment	0.0
Subtotal	143.7
Gen. Admin.	19.7
Total	163.4

Salmon Growth and Mortality

Project Number:	95320A
Restoration Category:	Research (continuation of 94320A)
Proposed By:	ADFG
Cost FY 95:	$267,800 (includes $48,700 for data analysis and report writing of FY 94 work)
Cost FY 96:	$267,800
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon and commercial fishing

INTRODUCTION

This project is a component of the Prince William Sound Systems Investigation-Sound Ecosystem Assessment (SEA) program. SEA is a multi-disciplinary effort to acquire an ecosystem-level understanding of the marine and freshwater processes that interact to constrain levels of fish, and marine bird and mammal production in Prince William Sound (PWS). The natural resources damaged by the *Exxon Valdez* oil spill cannot be effectively restored without understanding ecosystem function. This is because restoration actions directed at injured species may cause unforeseen affects within the ecosystem impacting other injured species. For example, efforts to restore salmon populations may cause predators such as walleye pollock to increase in abundance leading to impacts on marine bird reproductive success. In this case, walleye pollock, a poor quality food resource for marine birds, may replace higher-quality fish species such as Pacific herring causing reduced energy intake and reproductive success in marine birds. Our understanding of ecological interactions of this kind is insufficient and must be improved to insure that restoration actions lead to expected results. The SEA program is designed to provide a level of understanding of ecosystem function sufficient for application by restoration managers.

NEED FOR THE PROJECT

Pink salmon runs to PWS failed in 1992 and 1993. These salmon run failures have drastically affected the economy of the PWS region which is largely based on the salmon resources. It is essential that we develop an understanding of the processes that are causing these events. This information is needed to develop a strategy to restore salmon runs in PWS, if possible. At the present time, it is not clear to what extent oil-spill impacts or environmental conditions may have contributed to these salmon run failures. Low returns of hatchery-produced salmon in both years indicates that the failures were likely caused by processes occurring during the juvenile lifestage. The growth and mortality rates of juvenile salmon released into PWS in 1992 suggests that a change in predation rate may have contributed to the observed run failures.

The proposed project will compare growth rates of juvenile pink salmon among years (1989-1995), track the migration of juvenile salmon in PWS, evaluate the carrying capacity of PWS for juvenile salmon and other age 0 fish, and develop techniques for estimating pink salmon mortality within the SEA study area. An evaluation of the carrying capacity of PWS is central to the restoration of salmon and herring as well as marine birds and mammals that feed on forage fish. Due to the co-dependence of these fish species on a limited food resource, restoration actions directed at any individual species will affect other species that compete with them for food. The information derived from the proposed project will be useful to restoration managers in making decisions regarding restoration actions affecting the ecological balance among fish species important to man and other apex predators.

PROJECT DESCRIPTION

The proposed project will track the migration of juvenile salmon through PWS, estimate juvenile salmon growth, contribute to carrying capacity studies, and develop techniques for estimating mortality within the SEA study area. The proposed project will provide data on diet composition of juvenile salmon, and collect samples of other juvenile fishes (sandlance, capelin, etc.) for later stomach analysis as part of the project Forage Fish Influence on Recovery of Injured Species. The data from both of these projects will be used to evaluate the carrying capacity of PWS for juvenile fishes. Information obtained from this project regarding the migratory pathway of juvenile salmon will provide the basis for the SEA study design. The proposed project will also develop techniques for estimating the mortality of pink salmon in PWS and the Gulf of Alaska. This information is needed to determine if recent run failures are caused by processes occurring within the SEA study area or outside of this region. During the past decade, five salmon hatcheries have been established within PWS. These facilities, operated by private non-profit corporations, will release approximately 500 million juvenile salmon in 1995. Approximately one million of these fish will be marked with a coded-wire tag (CWT). Recovery of these CWT fish will play a major role in tracking the migration and growth of juvenile salmon.

A. Objectives

This project will achieve the following six objectives in 1995.

1. Estimate the growth rate and condition of juvenile CWT salmon in PWS in 1995, and test for differences in growth rate among years (1989-1995).

2. Describe the migration of juvenile salmon through PWS, estimate migration rate, and provide inseason data to other SEA researchers.

3. Estimate diet composition of juvenile pink salmon in PWS in 1995, test for differences in diet composition among years (1989-1992, 1994, 1995), and collect juvenile fish stomach samples for the project Forage Fish Influence on Recovery of Injured Species.

4. Determine if the growth rate of juvenile salmon was likely limited by low food abundance in 1995.

5. Test for differences in the relationship between juvenile salmon growth and fry-to-adult survival among years (release years 1989-1994).

6. Develop techniques to estimate the mortality of juvenile pink salmon within the SEA study area.

B. Methods

Objective 1:
Juvenile pink salmon will be collected using beach and purse seines deployed from a 6 m long aluminum skiff. Sampling will begin the first week of May and extend to the end of June. An approximately 25 m long vessel will provide logistical support to the field crew enabling them to track the juvenile salmon migration and obtain samples of fry from a large area. Juvenile salmon will be located from visual surveys of nearshore nursery habitats. A portable tube CWT detector will be used to isolate CWT juvenile salmon from untagged fish in the catch. All CWT salmon will be retained for later analysis of growth. The total number of fish in the catch will be estimated volumetrically. Water temperature at 1 m depth will be measured at all sample sites using a thermistor.

A stratified-random sampling design will be employed to estimate the growth rate of juvenile pink salmon in PWS. Strata will be established based upon recovery date (May, June), hatchery, and treatment group. Three treatment groups receiving different feeding regimes at the hatcheries will be employed: (1) an early-fed group composed of individuals released during high zooplankton abundance after 1-2 weeks of feeding in net pens, (2) a direct-release group released during high zooplankton abundance after only 2-5 days of feeding, and (3) a late-fed group released during declining zooplankton abundance and increasing temperatures after 1-2 weeks of feeding.

Coded-wire tags will be extracted and interrogated as they are recovered in the field. This will enable specific treatment groups to be targeted. Methods developed by the ADFG CWT Laboratory for extracting and interrogating CWTs will be employed. Analysis of variance (split-plot design) will be used to test for differences in growth rate among years. Recovery site will be used as the sample unit in the analysis. Condition of CWT juvenile salmon will be examined to evaluate feeding and growth conditions.

Objective 2:
Immediately after the juvenile salmon are released from the Wally H. Noerenberg (WHN) Hatchery, the sampling crew will begin surveys of nearshore habitats adjacent to the hatchery. The sampling crew will start surveying at a distance from the hatchery and move toward it until juvenile salmon are encountered. It is expected that this approach will enable detection of the leading edge of the juvenile salmon migration as the fish move away from the hatchery. CWT juvenile salmon will be recovered from selected schools to determine the origin and time of release of the fish. The migration rate of juvenile salmon will be estimated during the initial phase of the migration from recovery of CWT fish. Later in the season after the fish have dispersed, it will likely not be possible to track the leading edge of the salmon migration or estimate migration rate.

Objective 3:
Stomach contents analysis will be used to estimate diet composition of juvenile salmon, examine diet overlap among juvenile fishes, and determine if the growth rate of juvenile salmon was likely limited by low food abundance. A stratified-random sampling design will be employed to estimate diet composition of juvenile salmon. Strata will be established based upon date (May, June), area, and habitat type. Site will be used as the sample unit in the analysis. Samples of untagged juvenile pink salmon (n=15) will be collected between 1500 and 2100 hours from approximately 10 randomly selected sites within each strata. Whenever possible, samples of other juvenile fishes (forage fish) will be collected along with samples of juvenile salmon.

Stomach contents analysis will be conducted later in the laboratory. Prey items in the gut will be identified to the lowest possible taxonomic level and enumerated. Prey biomass in each category will be estimated by the product of prey abundance and average prey wet weight. Total stomach contents weight will be measured to an accuracy of 0.1 mg. Diet composition will be expressed as a proportion of total stomach contents weight. Stomach fullness will be expressed as a proportion of fish body weight. An analysis of variance will be conducted to test for differences between years in total stomach contents weight and biomass in each prey category after the data are rank transformed. Independent variables in the model will include date (May, June), area, and habitat type.

Objective 4:
A simple bioenergetics model will be applied to evaluate whether the growth of juvenile pink salmon was likely limited by low prey density in 1995. The model will estimate the time required for a 1 g pink salmon to obtain a maximum daily ration composed of either large or small copepods at specific temperatures and prey densities. The time required to obtain a ration composed of mixed prey will be estimated from diet composition data and model estimates of

feeding times required for large and small copepods, respectively. Feeding times in excess of available daylight will indicate that the fish may not have acquired the maximum daily ration.

Objective 5:
The relationship between juvenile growth rates and fry-to-adult survival will be evaluated from recoveries of CWT juveniles and adults. The Pink Salmon Coded-wire Tag Recovery project will provide data on survival rates of CWT pink salmon released in 1994. Analysis of covariance will test for differences in the intercept and slope of the regression model between years. Mean growth and survival rates for fish from various treatment groups (early fed, direct release, late fed) will be used in the analysis. The independent variable will be release year with mean growth rate of juvenile pink salmon in each treatment group as a covariate.

Objective 6:
A feasibility study will be conducted to develop a technique to estimate the mortality of pink salmon in PWS and the Gulf of Alaska. This critical element of the SEA program is intended to determine if year-class success is established in PWS. It is expected that a full-scale project will be initiated during the 1996 field season when otolith mass-marked pink salmon will be released from PWS hatcheries. The project will employ a technique developed by Parker. In 1996, pit tags will be applied to large juvenile pink salmon (total length > 100 mm) captured near the southwest entrances to PWS. At about 100-125 mm in length, juvenile pink salmon migrate from bays and passages into the coastal zone adjacent to the Gulf of Alaska). If possible, pink salmon of primarily hatchery origin will be tagged, because in this case recovery of tagged adults will be greatly simplified. If wild fish are tagged, the tag recovery program will need to scan wild fish in hundreds of streams in PWS - greatly increasing the cost of the program. Feasibility studies conducted in 1994 and 1995 will determine if large juvenile pink salmon of primarily hatchery origin can be captured near the southwest entrances to PWS in large numbers. In early July, a purse seine vessel will use an approximately 250 m x 20 m (11/16 " stretch mesh) purse seine to capture juvenile salmon. The vessel and gear will be provided by the Juvenile Salmon & Herring Integration component of the SEA program.

C. Schedule

The field season for this project will be from April to July of each year. Laboratory and data analysis will be conducted during the remainder of the year.

Track Migration & Growth
5/1/95 - 6/30/95 Track migration and growth
7/6/95 - 7/10/95 Sample juveniles exiting PWS

Laboratory & Data Analyses
7/1/95 - 12/31/95 Conduct stomach contents analysis
1/1/96 - 3/31/96 Analyze data and prepare annual report

D. Technical Support

Hydroacoustic assessments of juvenile salmon distribution and abundance will be provided by the Nearshore Fish component of SEA. Data archiving services will be required for this project to insure that all information is adequately documented and archived. This service will be provided by the modeling and data management component of SEA.

E. Location

This project will be conducted in PWS which has experienced failures in both wild and hatchery salmon runs in 1992 and 1993. The economic health of the communities (Whittier, Valdez, Cordova) in this region is dependent on the salmon resource. The proposed project will focus sampling effort in western PWS which is known to be a major migratory pathway for juvenile salmon exiting the Sound.

PROJECT IMPLEMENTATION

The ADFG will collect field samples of juvenile salmon for this project. The ADFG is responsible for managing the pink salmon resource in the PWS area. In addition, the ADFG is responsible for the development, oversight, and evaluation of the salmon enhancement program. The recent decline in salmon survival in PWS has jeopardized the viability of the salmon enhancement program. The ADFG has conducted field studies on juvenile salmon in PWS during the past five years. Stomach contents analyses of juvenile salmon will be conducted by the National Marine Fisheries Service, Auke Bay Laboratory (Molly Sturdevant) and the University of Alaska Fairbanks (Steve Jewitt). The proposed project will also collect samples that will be analyzed within the project Forage Fish Influence on Recovery of Injured Species.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be highly integrated with several other components of the SEA Program as well as other projects in the FY 95 workplan. Within the Physical Oceanography component of SEA, conductivity, temperature, depth (CTD) profilers will be deployed from vessels working under Salmon Growth and Mortality. Within the Zooplankton component of SEA, zooplankton samples will be collected using nets deployed from vessels working under Salmon Growth and Mortality. Salmon Growth and Mortality will also provide fish stomach samples for the project Forage Fish Influence on Recovery of Injured Species. The Pink Salmon Coded-wire Tag Recovery Project will provide data on survival rates of pink salmon released from PWS hatcheries. This data is essential to quantify the relationship between juvenile salmon growth and fry-to-adult survival. The proposed Otolith Mass Marking Project will develop a new mass marking tool for pink salmon in PWS. Mass marking of juvenile salmon will greatly improve the feasibility of studies designed to examine interactions between wild and hatchery salmon during the early marine period. All data collected as part of Salmon Growth and Mortality will be provided to the Information and Modeling component of SEA.

FY 95 BUDGET ($K)

Personnel	170.1
Travel	1.2
Contractual	49.8
Commodities	17.7
Equipment	0.0
Subtotal	238.8
Gen. Admin.	29.0
Total	267.8

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Prince William Sound Pink Salmon Genetics

Project Number:	95320D
Restoration Category:	General Restoration (continuation of 94320D)
Proposed By:	ADFG
Cost FY 95:	$227,000 (includes $56,500 for data analysis and report writing on FY 94 work)
Cost FY 96:	$133,100
Total Cost:	$360,100
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon and commercial fishing

INTRODUCTION

Historically, approximately five-hundred-million wild pink salmon fry emerged from streams throughout Prince William Sound (PWS) each year to migrate seaward. Adult returns of wild pink salmon averaged from 10 to 15 million fish annually. Unlike returns of adult hatchery fish, these returning wild-stock adults play a critical role in the total Prince William Sound ecosystem; they convey essential nutrients and minerals from the marine ecosystem to estuaries, freshwater streams, and terrestrial ecosystems. Both juveniles and adults are important sources of food for many fish, birds, and mammals. Wild pink salmon also play a major role in the economy of PWS because of their contribution to commercial, sport, and subsistence fisheries in the area.

Wild-stock pink salmon suffered both direct lethal and sublethal injuries as a result of the *Exxon Valdez* oil spill (EVOS). Pink salmon embryos and alevins suffered increased mortality, diminished growth, and a high incidence of somatic cellular abnormalities as a result of spawning ground contamination and rearing in oiled areas. Elevated mortality of embryos in the oiled streams has continued through 1993, raising the specter of petro-chemical induced genetic damage. Also, in 1989 the commercial harvest of pink salmon had to be shifted away from the hatchery and wild stocks in the oiled areas to target only the wild stocks in eastern Prince William Sound. This resulted in over-harvest and depletion of these stocks evidenced by general run failures of eastern-sound stocks in 1991. Wild-stock run failures in the Southwest area of the Sound have continued through the 1992 and 1993 fishing seasons.

Prince William Sound is the center of one of the State of Alaska's largest aquacultural industries. Alaska Department of Fish and Game has admittedly been grappling with management of the wild stocks in face of intractable hatchery/wild-stock interactions for nearly a decade. The EVOS-related damages to wild stocks, coupled with full-scale hatchery egg takes, has exacerbated wild-stock management concerns. The commercial fishing industry and the regional aquaculture association are facing serious financial challenges due to the alterations in management imposed resulting from declines in abundance of wild pink salmon stocks.

NEED FOR THE PROJECT

Understanding genetic structure of the wild stocks inhabiting PWS is critical to their management and conservation. For example, managing on too fine a scale may adversely affect the fishing industry and waste management resources, while managing on too large a scale may result in loss of genetic adaptations and diversity in the wild pink salmon populations within Prince William Sound. Knowledge gained through this project is needed to correctly interpret and apply the findings obtained from the proposed ecosystem analyses on a population basis, more properly define the population-level nature of the damage documented in previous study of EVOS damaged pink salmon, and otherwise guide the decision-making process in the management-oriented restoration of the EVOS-damaged pink salmon populations.

PROJECT DESIGN

A. Objectives

1. Define the genetic structure of pink salmon stocks in the EVOS-affected area in order to better direct harvest management decisions made for restoration purposes on a stock-specific rather than species-specific basis.

2. Provide information needed for genetic risk assessment and genetic monitoring of supplementation programs (e.g., as a result of Restoration Science Project R105) to guide stock-specific restoration and enhancement.

B. Methods

Tissues for baseline genetic data will be collected from up to 100 individuals from each of 30 spawning aggregations each year. This will include two hatcheries and 28 wild-stock streams in the affected areas of Prince William Sound. Pink salmon have a two-year life cycle. Even and odd-year pink salmon are genetically distinct, so both must be sampled. Sampling will be designed to include both early and late stocks and inter-tidal and upstream-spawning stocks. Tissue samples from heart, liver, muscle, and aqueous humor from each individual will be immediately frozen on liquid nitrogen and returned to Anchorage for storage at -80° C.

Sampling will be done in coordination with other restoration programs in order to reduce costs and facilitate cross-referencing of biological data. For example, suitable samples from odd-year stocks are already available from tissue collections made as a part other studies. Samples for even-year stocks would be collected as a part of Restoration Science Study 94192.

Genetic data will be collected using the techniques of allozyme electrophoresis on all samples. A pre-oil spill data base of allozyme frequencies exists for Prince William Sound pink salmon which facilitates analyses of potential changes of population structure and gene flow. A pilot study using DNA techniques will be conducted on a subset of samples. ADFG anticipates contracting the laboratory analyses of the allozyme portion of the study to a qualified bidder. Data analyses will be conducted by ADFG, and data will be merged into the state and federal inter-agency databases.

C. Schedule

Activity	Inclusive Dates	
Advertise and award contract for allozyme analyses	June 1994	August 1994
Lab analyses (odd-year samples)	August 1994	April 1995
Data analyses	December 1994	June 1995
Additional field collections	July 1994	August 1994
Draft status report FY 94	March 1995	
Final status report FY 94	August 1995	
Lab analyses (even year)	March 1995	February 1996
Data analyses	September 1995	May 1996
Draft status report FY 95	May 1996	
Final report	September 1996	

D. Technical Support

Administrative support is provided by the Administrative, Habitat, and Commercial Fisheries Development and Management Divisions staff of the Alaska Department of Fish and Game. The project leader is fully funded with general funds from the State of Alaska. Project assistants are fully or partially funded by this project. Laboratory support is provided by the ADFG Genetics Program which includes facilities for tissue archival, allozyme analysis, PCR-based and other DNA analyses, and data analyses. These studies are integrated with ongoing

studies by the Commercial Fisheries Division for efficiency in completing the objectives.

E. Location

The field portion of this project will be conducted in Prince William Sound (based out of Cordova), and the data analyses will be completed in Anchorage. The project outcome will influence the long-term viabilities of wild stocks in Prince William Sound which will in turn affect the economies of the fishing communities therein.

PROJECT IMPLEMENTATION

The research direction, DNA pilot study, and data analysis will be done at the Alaska Department of Fish and Game Genetics Laboratory. We have extensive experience with genetic stock identification projects, we conducted the pre-oil spill genetic analysis of area populations, and we have developed software to handle acquisition, management, and analysis of large data sets.

The allozyme analysis portion of this project will be contracted to a qualified bidder following the state bidding process. The allozyme portion will not be done in-house in order to optimize use of Department staff and facilities on projects in progress (such as the genetic analysis of Cook Inlet sockeye salmon, EVOS study 94255).

We have already implemented a screen for mtDNA variation on six populations using an analysis of restriction fragment length polymorphisms. Data from 16 restriction endonucleases confirm earlier allozyme results that showed that even- and odd-year pink salmon have discrete population structure. These preliminary results also suggest structure separating eastern and western Prince William Sound populations.

Sample collection for fiscal year 1995 will be accomplished by ADFG staff from the Cordova office. Funds for the necessary air charter were originally a part of the budget of one of the Cordova-based projects that was deferred by the *Exxon Valdez* trustee council. This project budget includes $30,000 to replace those costs.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Some sample collections were opportunistically conducted by personnel working on pink salmon egg/fry survival projects during 1991 and 1992. Additional sample collections in 1994 will be integrated between 94191 (oil-related embryo mortalities) and this project in order to most efficiently utilize resources. Collections will represent populations of concern identified in part by coded-wire-tag project 94184.

DNA analyses for this project are integrated with those of Trustee Council projects 94255 (Kenai River sockeye salmon) and project 94191.

No funds are requested for biometrics support of this project. Biometrics will be integrated into the responsibilities of the genetics staff biometrician who is primarily funded from general funds and partially funded from project 94255.

FY 95 BUDGET ($K)

Personnel	49.8
Travel	5.0
Contractual	140.0
Commodities	15.0
Equipment	0.0
Subtotal	209.8
Gen. Admin.	17.2
Total	227.0

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Juvenile Salmon and Herring Integration

Project Number:	95320E
Restoration Category:	Research (continuation of 94320E)
Proposed By:	ADFG
Cost FY 95:	$943,100 (includes $98,000 for data analysis and report writing of FY 94 work)
Cost FY 96:	$927,100
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring, pink salmon, commercial fishing

INTRODUCTION

This project is a component of the Prince William Sound Systems Investigation-Sound Ecosystem Assessment (SEA) program. SEA is a multi-disciplinary effort to acquire an ecosystem-level understanding of the marine and freshwater processes that interact to constrain levels of fish, and marine bird and mammal production in Prince William Sound (PWS). The natural resources damaged by the *Exxon Valdez* oil spill cannot be effectively restored without understanding ecosystem function. This is because restoration actions directed at injured species may cause unforeseen affects within the ecosystem impacting other injured species. For example, efforts to restore salmon populations may cause predators such as walleye pollock to increase in abundance leading to impacts on marine bird reproductive success. In this case, walleye pollock, a poor quality food resource for marine birds, may replace higher-quality fish species such as Pacific herring causing reduced energy intake and reproductive success in marine birds. Our understanding of ecological interactions of this kind is insufficient and must be improved to insure that restoration actions lead to expected results. The SEA program is designed to provide a level of understanding of ecosystem function sufficient for application by restoration managers.

The proposed project is a continuation of the Salmon Predation component of the SEA program. The name of the project has been changed to reflect the level of integration between this project and the other components of SEA, as well as the greater emphasis placed on collection of juvenile herring samples in FY95. The primary purpose of this project is to determine to what extent variations in predation affect the survival of juvenile pink salmon, and identify and describe the mechanisms that cause variations in predation. The project will also collect samples for the following projects: (1) Juvenile Herring Growth and Habitat Partitioning and (2) Forage Fish Influence on Recovery of Injured Species. Vessel charters for all shared research platforms, including the critical Physical Oceanography and Zooplankton components of SEA, are also included in this project.

NEED FOR THE PROJECT

The pink salmon (*Oncorhynchus gorbuscha*) return to PWS failed in 1992 and 1993, and the Pacific herring (*Clupea harengus pallasi*) population collapsed in 1993. The economic survival of the communities in the PWS region is dependent on restoration of these fishery resources. At the present time, it is not clear to what extent oil-spill impacts or environmental conditions may have contributed to these run failures. The SEA program will investigate ecological processes that may have contributed to the loss of salmon and herring populations and that will affect their restoration. The Salmon and Herring Integration component of SEA will examine predation on juvenile salmon and collect fish samples for several other restoration projects. Low returns of hatchery-produced salmon in 1992 and 1993 indicates that the salmon run failures were likely caused by processes occurring during the juvenile lifestage. The growth and mortality rates of juvenile salmon released into PWS in 1992 suggests that a change in predation rate may have contributed to the observed run failures. The ecological processes that may have caused the collapse of these fish populations must be understood to identify appropriate restoration actions. Important fish predator species may include adult pink salmon and herring, walleye pollock (*Theragra chalcogramma*), Pacific cod (*Gadus macrocephalus*), and dolly varden trout (*Salvelinus malma*).

Additionally, since this project provides platforms and sample collection for several core SEA projects, it is critical to the overall success of the SEA program.

PROJECT DESIGN

This is a multi-year project designed to test two hypotheses regarding mechanisms that may regulate predation on juvenile salmon and herring (and other age-0 fish) in PWS. Regulation of prey population size by a predator requires that prey mortality rate increase with prey population size (i.e density-dependent mortality. Intense predation immediately after ocean entry may have contributed to poor survival of relatively large release groups of hatchery-reared coho salmon. Learned behavior or response to environmental cues may cause predators to aggregate in areas where prey are consistently abundant. Alternatively, predation on a prey population may increase when the preferred prey of potential predators is not available. In the

northern Gulf of Alaska, predators such as juvenile walleye pollock that prefer macrozooplankton may switch to age-0 fish when macrozooplankton abundance is low. Macrozooplankton abundance was very low in PWS in 1992 indicating that predators may have switched to juvenile salmon. The following hypotheses will be tested by the project: (1) The predation rate (mortality rate) on juvenile salmon is greater when juvenile salmon abundance is high. (2) The predation rate on juvenile salmon is greater when macrozooplankton abundance is low.

A. Objectives

1. Estimate the juvenile salmon consumption rate of fish predators in Prince William Sound.

2. Determine the relationship between juvenile salmon predation rate and macrozooplankton abundance.

3. Determine the relationship between juvenile salmon predation rate and juvenile salmon abundance.

4. Collect samples for the following projects (1) Herring Growth and Habitat Partitioning and (2) Forage Fish Influence on Recovery of Injured Species.

5. Provide shared sampling platforms for the SEA Program.

B. Methods

Objective 1

Fish biomass, food consumption rate (daily ration), and diet composition must be estimated for each potential predator species to estimate juvenile salmon consumption rate. The Nearshore Fish component of the SEA program will estimate fish biomass using hydroacoustic techniques. The Juvenile Salmon & Herring Integration component of SEA will estimate predator species and size composition, food consumption rate, and diet composition.

Field studies will be initiated on April 20 and continue until July 22. Approximately 180 million juvenile salmon will be released from the Wally H. Noerenberg (WHN) Hatchery beginning in late April through late May. The high abundance of juvenile salmon near the hatchery will increase the likelihood of encountering salmon in predator stomachs. Estimates of juvenile salmon consumption rate will be made for six ten-day sampling periods in two study areas in northwest and southwest PWS. The first four surveys will be conducted in northwest PWS prior to June 15 when juvenile salmon released from the WHN Hatchery will likely be abundant in the area. The last two surveys will be conducted in southwest PWS prior to July 22 when juvenile salmon from all hatcheries in PWS will likely be abundant in the area. Three vessels will be employed to sample salmon predators during predation rate surveys. An approximately 25 m trawl vessel will sample fish in offshore areas using a 40 m x 28 m mid-water wing trawl equipped with a net sounder. Two purse seine vessels will sample salmon predators in

nearshore areas using small-mesh seines. A stratified random sampling program will be employed to minimize the variance estimate of predator biomass and the proportion of predator stomach contents weight comprised of juvenile salmon. As a result, strata will be established based upon the abundance of predators and juvenile salmon in the study area. The daily ration of salmon predators will be estimated from diel feeding periodicity studies conducted once during each ten-day sampling period.

Objective 2
Multiple regression analysis will be used to provide an assessment of the macrozooplankton-dependent predation hypothesis. Juvenile salmon predation rate will be used as the dependent variable in the model with macrozooplankton abundance (from the Zooplankton component) as the independent variable. Data from paired predator stomach and macrozooplankton samples will be used in the analysis.

Objective 3
Multiple regression analysis will be used to provide an assessment of the density-dependent predation hypothesis. Juvenile salmon predation rate will be used as the dependent variable in the model with juvenile salmon abundance (from the Nearshore Fish component) as the independent variable. Paired estimates of juvenile salmon density (hydroacoustic) and juvenile salmon predation rate will be used in the analysis.

Objective 4
Fish samples will be collected for two proposed FY95 projects: (1) Herring Growth and Habitat Partitioning, and (2) Forage Fish Influence on Recovery of Injured Species. Samples of juvenile herring will be collected in nearshore and offshore habitats in passages in PWS. Data files will be provided to the Herring Growth and Habitat Partitioning project detailing the distribution, size, and age of herring collected in the study area. Fish samples will be provided to the Forage Fish Influence on Recovery of Injured Species project for analysis of stomach contents.

Objective 5
Two vessels will be chartered to provide shared sampling platforms for the SEA program. A mid-water trawl vessel will conduct mid-water trawling, CTD sampling, vertical plankton net sampling, and hydroacoustic surveys for fish. A smaller vessel will accompany the trawler to provide a platform for ADCP, OPC, Tucker Trawl sampling, and high frequency hydroacoustic sampling.

C. Schedule

The field season for this project will be from March to July of each year. Laboratory and data analysis will be conducted during the remainder of the year.

Predation Rate Surveys	
April 20 - April 30	Northwest PWS Survey
May 1 - May 11	Northwest PWS Survey
May 20 - May 30	Northwest PWS Survey
June 1 - June 11	Northwest PWS Survey
June 19 - June 31	Southwest PWS Survey
July 6 - July 18	Southwest PWS Survey
Laboratory & Data Analyses	
June 1 95 - Dec 31 95	Conduct stomach contents analysis and read otoliths
Jan 1 96 - Mar 31 96	Analyze data and prepare annual report

D. Technical Support

Hydroacoustic estimates of predator abundance, biomass, and size composition will be provided by the Nearshore Fish component of SEA. Data archiving services will be required for this project to insure that all information is adequately documented and archived. This service will be provided by the modeling and data management component of SEA.

E. Location

This project will be conducted in PWS which has experienced failures in both wild and hatchery salmon runs in 1992 and 1993. The economy in the PWS region is based upon these salmon resources. The economic health of the communities (Whittier, Valdez, Cordova) in this region is dependent on the salmon resource. During the first year of study, the project will focus sampling effort in western PWS which is known to be a major migratory pathway for juvenile salmon exiting the Sound.

PROJECT IMPLEMENTATION

The ADFG will conduct field sampling and laboratory processing of fish predators collected by this project. The ADFG is responsible for managing the pink salmon resource in the PWS area. In addition, the ADFG is responsible for the development, oversight, and evaluation of the salmon enhancement program. The recent decline in salmon survival in PWS has jeopardized the viability of the salmon enhancement program. The ADFG has conducted field studies on juvenile salmon in PWS during the past five years. This project will collect samples that will be analyzed within two additional projects (1) Herring Growth and Habitat Partitioning and (2) Forage Fish Influence on Recovery of Injured Species. Sample and data analysis in these projects will be contracted to the University of Alaska.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be highly integrated with several other components of the SEA Program. The Physical Oceanography, Nearshore Fish, Zooplankton, and Phytoplankton components of SEA will share research platforms with the Juvenile Salmon and Herring Trophics and SEA Vessel Support. Within the Physical Oceanography component of SEA, conductivity, temperature, depth (CTD) profilers and Acoustic Doppler Current Profilers (ADCP) will be deployed from the mid-water trawl vessel that will be chartered as a part of Salmon Predation. Within the Nearshore Fish component of SEA, hydroacoustic gear will be deployed from the mid-water trawl vessel and a dry lab will be provided on the vessel for a hydroacoustic technician. Within the Zooplankton and Phytoplankton components, zooplankton and water samples will be collected using nets and water bottles from the mid-water trawl vessel. Each of the two seine vessels chartered by Salmon Predation will provide logistical support (bunks, meals, etc.) for an associated small hydroacoustic boat. The hydroacoustic technician will be responsible for CTD deployment. Fishery biologists on each seine vessel will collect zooplankton samples for the Zooplankton component. Salmon Predation will also collect age-weight-length data from forage fish and provide stomach samples for the Forage Fish Project. The Pink Salmon Coded-wire Tag Recovery Project will provide data on survival rates of pink salmon released from PWS hatcheries. This data is essential to quantify the effect of predation on juvenile salmon survival rates. The Otolith Mass Marking Project will develop a new mass marking tool for pink salmon in PWS. Mass marking of juvenile salmon will greatly improve the feasibility of studies designed to examine interactions between wild and hatchery salmon during the early marine period and later during spawning. All data collected as part of the Juvenile Salmon & Herring Integration project will be provided to the Information and Modeling component of SEA.

FY 95 BUDGET ($K)

Personnel	374.9
Travel	2.8
Contractual	374.4
Commodities	97.0
Equipment	17.8
Subtotal	866.9
Gen. Admin.	76.2
Total	943.1

SEA Plankton Dynamics: Phytoplankton and Nutrients

Project Number:	94320G
Restoration Category:	Research (continuation of 94320G)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	ADFG
Cooperating Agencies:	NOAA
Cost FY 95:	$239,300 (includes $88,500 for data analysis and report writing of FY 94 work)
Cost FY 96:	$283,400
Total Cost:	$522,700
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

The Sound Ecosystem Assessment program (SEA) targets the restoration of recruitment success of pink salmon and herring from the perspective of ecosystem process controls. Specifically, the SEA hypothesis is that restoration of fish stocks is regulated by the physical forces on the circulation of Prince William Sound, which alternates between years of strong through-flow, river-like conditions, and relatively stagnant, lake-like conditions. The ecological consequence of these alternate conditions is a high biomass of large zooplankton in lake years that becomes the primary nourishment for target fish and their predators (this has been termed the "middle-out" food web control). In alternate river years, the large zooplankton are sparse and predation on the target species predominates (the "top-down" control).

While middle-out/top-down is the principal hypothesis being tested by SEA research, ecological theory provides another possibility, that of "bottom-up" control, where the restoration of populations of upper trophic level species is modulated by variations in nutrient-driven phytoplankton production. In this hypothesis the structure and composition of the zooplankton community can be determined by variations in phytoplankton primary production and by the species composition of the phytoplankton community. For example, a phytoplankton population dominated by large diatoms may support an abundance of large oceanic copepods, whereas a

phytoplankton population dominated by smaller flagellates may result in a reduced number of larger copepods, or in a shift to a zooplankton community dominated by smaller neritic copepod species. Variations in the timing of phytoplankton populations have been previously suggested to be a control of ecosystem events in Prince William Sound). In this component, we will provide the nutrient and phytoplankton data that are essential to evaluate the influence of phytoplankton dynamics on the food web and test the role of the bottom-up hypothesis in ecosystem restoration.

A central tenet of the SEA hypothesis is the variable advection of Gulf of Alaska waters into Prince William Sound. Advection affects not only zooplankton populations, but also the Prince William Sound phytoplankton populations and production. Strong advection may confound the effects of in situ primary production in the Sound. To further test the hypotheses and evaluate the overall ecosystem restoration, we propose to use satellite-derived sea-surface temperatures to monitor the movement of Gulf of Alaska surface waters into Prince William Sound and, after September 1994, to use satellite-measured surface chlorophyll concentrations to determine the effect of advection on the observed chlorophyll field. We will also take over the moored instrument array (C-LAB) that has been gathering continuous relevant data for the past two years.

PROJECT DESCRIPTION

All components of the marine ecosystem study will benefit from this project. Primary production is the basis of the food web, hence any evaluation of restoration must consider the phytoplankton community and its production. In a general way, all subsequent energy transfers are ultimately based on the phytoplankton production in the sound or the phytoplankton biomass imported in the oceanic waters by advection. Many species in PWS have suffered declines in recent years. In particular, the pink salmon and herring populations in the sound have been damaged and are not recovering in a predictable manner. Also harbor seals, predators of these and other fishes, are continuing to decline. While many ideas have been proffered about the causes of mortality and/or low production, food cannot be ruled out, and hence phytoplankton production is directly or indirectly implicated in restoration and maintenance of the ecosystem. Surprisingly, there has been almost no work on phytoplankton in Prince William Sound since the earliest impact studies in the 70's and it was not until 1993 that a complete cycle of phytoplankton was measured (via the C-LAB buoy). Throughout the oil spill recovery period there has been no measurement of ambient nutrient conditions or phytoplankton biomass and production. Consequently, what is often considered a major deterministic variable of food webs in other marine systems has been ignored in these damage and restoration studies.

This project is one part of the multi-component SEA and Related Studies program in Prince William Sound, which has been designed to provide a comprehensive ecosystem-based understanding of restoration in upper trophic levels, specifically in pink salmon, herring, marine bird, and marine mammals. Within SEA, the Phytoplankton and Nutrient project will work most closely with the Physical Oceanography/Meteorology, Zooplankton, and Ecosystem Data Base

and Modeling projects. The phytoplankton and nutrient work proposed here will provide data for the examination of the temporal and spatial variability in the chemical and primary production fields, and for the testing of the hypothesis of "bottom-up" control of recovery in the Prince William Sound ecosystem. The analyses from this project also provide the patterns of response of phytoplankton and primary production to oceanographic and climate changes that can be used by all projects to test ideas about good vs. bad years in fluctuations of other target species.

A. Objectives

This study is designed to investigate the role of phytoplankton productivity and nutrient cycles in ecosystem restoration. This includes the pattern, amount, and type of phytoplankton growth and the major inorganic nutrient fields associated with the growth processes. Our hypothesis is that variations in the phytoplankton production and populations, as functions of ocean mixing, nutrients and light, are transferred to the zooplankton and these processes are crucial to ecosystem restoration.

The specific objectives are:

1. To measure the timing and biomass of phytoplankton cycles;
2. To measure the primary production of phytoplankton;
3. To determine the spatial and temporal patterns in phytoplankton distribution using satellite imagery;
4. To determine the species structure of phytoplankton communities;
5. To measure the distribution and quantity of major inorganic nutrients including nitrate+nitrite, ammonium, phosphate, silicate and iron;
6. To maintain the moored instrument array (C-LAB) to collect time series data on phytoplankton (fluorescence) and related oceanographic and climate data;
7. To evaluate the role of phytoplankton and nutrient cycles in restoration processes through the SEA ecosystem model.

B. Methods

Field work will be done in conjunction with other projects that require a vessel and from shore sites (hatcheries). We need two people on a cruise to accomplish the work program. When vessel time is not available, we will conduct work from a shore base at the PWSAC Esther Island or Sawmill Bay hatchery. Timing of the field work must be arranged to cover the spring phytoplankton increase (March-April). Based on the limited historical data and the excellent record obtained in 1993-94 by the C-LAB buoy, the sampling period should begin in mid-March

and extend to July. Discrete sample times can be integrated with the assistance of the continuous chlorophyll record obtained from the C-LAB buoy sensor array and satellite data.

Phytoplankton Biomass, Spatial and Temporal Patterns
Phytoplankton biomass will be determined using the standard chlorophyll technique using a Turner Designs Fluorometer. Data will be collected at locations that allow mapping the areal pattern and at selected depths that describe the water column profile. At each location (station) water samples are collected with a Niskin Sample Bottle and an aliquot (0.5 to 1 liter) filtered to collect the contained plankton. The chlorophyll in the sample is extracted with the appropriate solvent and the fluorescence of the solution measured quantitatively with the fluorometer. Chlorophyll units are converted to carbon biomass using carbon to chlorophyll ratios determined from the field samples.

Phytoplankton Primary Production
The biomass pattern provides a picture of what is present, but it does not provide information on phytoplankton dynamics. For example, a phytoplankton population with a relatively low chlorophyll value may be growing rapidly, but not exhibiting an increase in chlorophyll concentration due to strong grazing by the zooplankton community. To determine the actual primary production rate, we will use a labeled inorganic carbon tracer to measure direct uptake of carbon by phytoplankton photosynthesis. As with chlorophyll, the measurements will be on samples from discrete depths that represent the phytoplankton community distribution in the water column. We will use standard techniques for deck incubations with more recent modifications to avoid contamination.

Field sampling will be based at PWSAC hatcheries or, when available, conducted on board ship with experiment incubations performed using natural or artificial light, depending on the location and capabilities of the site. Since these are time-dependent measurements, they will be done once per day.

Phytoplankton Community Composition:
While biomass and rate measurements provide information on the availability of food, they do not give insight on the potential quality of phytoplankton as food. This requires a more detailed examination of the plant community composition. The composition of the phytoplankton community may be as important as the total primary production in determining zooplankton species and abundance. We use 25 ml aliquots and preserve them in Lugol's solution for later species identification using inverted microscopy. In 1995, we will monitor the distribution of phytoplankton and other particulates using a WET Labs Dual Path Absorption and Attenuation Meter (available from another project). This instrument can be configured to provide continuous attenuation and chlorophyll absorption measurements from an underway vessel. We will analyze the resulting distribution of phytoplankton and other particulates to monitor spatial and temporal changes in chlorophyll concentration and particle size distribution.

Satellite Image Analysis:
Satellite images are a powerful integrative tool. Once we obtain some field samples for ground truth data, images are valuable sampling mechanisms to examine the pelagic ecosystem on a broad geographic scale and over the entire year. We use NOAA Advanced Very High Resolution Radiometer (AVHRR) imagery from the University of Alaska Fairbanks High-Resolution Picture Transmission (HRPT) ground station. This station has been operational since 10 August, 1993. The AVHRR data is processed to produce sea-surface temperature images of the region. We use these images to monitor the inflow of water to Prince William Sound and to determine the spatial extent of water masses identified by the field program. This information will be available to all SEA investigators. We will acquire ocean color imagery of Prince William Sound from the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) after the launch of the SeaStar satellite in September, 1994. Images of chlorophyll distribution are possible from the SeaWiFS data using both Terascan and Seapak image processing software. We will analyze the chlorophyll and sea-surface temperature images to determine the spatial and temporal variability in the surface water masses and phytoplankton in the sound throughout the year. The satellite data will allow us to put the field data into the correct spatial and temporal context. D. Eslinger will be responsible for providing the processed AVHRR (and SeaWiFS imagery to NASA approved SeaWiFS investigators) as part of the Ecosystem Data Base and Modeling project.

Nutrient Fields:
Phytoplankton require the major inorganic nutrients -- nitrogen, phosphorus and silica-- for growth. Nutrients are supplied by the general oceanographic circulation and run-off. Since phytoplankton also require light, the problem is understanding how the nutrients are supplied to the illuminated zone of the sea. Here we will gather quantitative data on the distribution of nutrients throughout the phytoplankton growth season. We expect that the depletion of nutrients will be the major factor that defines the period of high phytoplankton growth. In the field, water samples are collected with Niskin Bottles at standard depths over the upper 100 m (deeper if necessary). A small aliquot (250 ml) is filtered and frozen for later chemical analysis. Chemical determination of the quantity of dissolved nitrogen (as nitrate, nitrite and ammonium), phosphate and silicate will be measured using prescribed methods with an Alpkem Auto-Analyzer in our laboratory in Fairbanks.

Moored Instrument Array: The C-LAB Buoy
In 1995 this project will take over the C-LAB moored instrument program developed by Dr. Cooney with support from the Alaska Science and Technology Foundation (ASTF). The ASTF support ends in 1994. The moored instruments provided two years of continuous data from the sound that has seminal value to all SEA projects (e.g. Figure 1). Here we assume the responsibility for maintaining and upgrading the mooring to insure quality data are available to SEA. The buoy continuously acquires wind speed and direction, barometric pressure, air temperature, sea surface temperature, chlorophyll fluorescence, and ocean temperature at 10 depths. The moored instruments provide a mechanism to integrate other discrete observations collected from ships or shore stations. The winter data are especially valuable since no other sampling is done at this time. The data presented (Fig. 1) are but a small subsample of those available; they show the spring increase in phytoplankton (i.e. chlorophyll fluorescence) and

corresponding air temperature that has an obvious effect on the timing and pattern of the phytoplankton bloom. The budget reflects the costs for assuming the C-LAB mooring. Actual replacement cost would be more than five times the amount included here.

Data Sharing:

All data from this project will be available electronically to the modeling project. We also expect to interact extensively with the modeling effort and the development of a coupled physical and primary production sub-model.

C. Schedule

This project will be conducted in 1994 and 1995. The field season will concentrate on the period March--July. All laboratory analysis of samples will occur following the field season. Satellite observations will begin in 1994 and continue throughout the duration of the project.

D. Technical Support

Nutrient analysis and phytoplankton species identification will be performed at the Institute of Marine Science Marine Ecosystem Laboratory at UAF using existing facilities. Field observations of chlorophyll will initially be performed using a Turner Designs flow-through fluorometer. Satellite image analysis will be performed at the IMS Remote Sensing Laboratory at UAF utilizing both Terascan and Seapak analysis packages.

E. Location

Prince William Sound

COORDINATION OF INTEGRATED RESEARCH EFFORT

The SEA phytoplankton and nutrient project will interact with other SEA projects by contributing information on the role in restoration processes of the timing and intensity of the spring phytoplankton bloom, the character and composition of the bloom, and the spatial extent and variability of the bloom and nutrient concentrations. We will interact with the physical and meteorological components to determine the effects of advective and mixing processes on nutrient and phytoplankton distributions. We will collaborate with the zooplankton project to determine the importance of in situ Prince William Sound primary production in determining the zooplankton dynamics and how this interacts with the river/lake hypothesis. We will work closely with the data and modeling project to provide appropriate parameter measurements and field "truth" data with which to check the model, and will help in the development of a nutrient, phytoplankton, zooplankton component for the model.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	230.2
Commodities	0.0
Equipment	0.0
Subtotal	233.2
Gen. Admin.	6.1
Total	239.3

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Role of Zooplankton in the Prince William Sound Ecosystem

Project Number:	95320H
Restoration Category:	Research (continuation of 94320H)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	ADFG
Cost FY 95:	$247,400 (includes $51,900 for data analysis and report writing of FY 94 work)
Cost FY 96:	$307,200
Total Cost:	Unknown
Duration:	3-5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

This proposal requests funding in FY95 to continue studies of the role of large zooplankton in the trophic ecology of Prince William Sound as part of the EVOS-sponsored Prince William Sound System Investigation (95320). The premise behind this research is that appropriate restoration activities can only be conducted within the framework of understanding how the marine ecosystem constrains the production of pink salmon and herring. The work described here is prefaced by a reviewed literature that documents that most of the mortality to a year class occurs in the early life stages.

A central hypothesis for the overall integrated ecosystem approach is that levels of predation on 0-class pink salmon and herring (and other fishes) are modulated each year by the amount of macrozooplankton present during the critical months of April and May. During years of high macrozooplankton abundance, all consumers (including 0-class fishes) derive substantial nutrition from plankton. Under these conditions, juvenile salmon and larval/post-larval herring are "sheltered" from predation, and losses to larger fishes are minimized. In contrast, during years (and seasons) when macrozooplankton populations are weak, consumers shift to piscivory, and losses of 0-class fishes (including salmon and herring) to predation are substantially elevated.

Data from other studies of the region indicate that flushing rates of the Sound's upper layers in April apparently modify amounts of large zooplankton (*Calanus/Neocalanus*) comprising a predictable early-season bloom. When the flushing rate is high, forge for juvenile pink salmon and herring is depleted by washout from the region. In contrast, when wind-forced flushing rates are low, the Sound retains these forage populations in higher densities. Seeding the Sound with overwintering forms in the summer from the adjacent deep ocean is also implicated in determining the amounts of subsequent springtime macrozooplankton in the surface layers.

Understanding how prey-switching is influenced by wind and buoyancy-forced transport (Physical Oceanography component), and relating levels of zooplankton-modulated predation during the early life stages of pink salmon and herring to subsequent adult production, provides a crucial benchmark for judging these and other factors (including oil related) that may be limiting the recovery of these injured species. The application of this information is fundamental to the larger question of restoration - activities and interventions - that can be evoked to return pink salmon and herring populations to healthy pre-spill levels.

NEED FOR THE PROJECT

Pink salmon and herring populations in Prince William Sound are listed by the EVOS Trustee Council as injured resources that are not recovering. Together, these two species have historically contributed about $40-50 million dollars to commercial fisheries, are harvested for subsistence use, provide substantial recreation and tourism opportunities, and play keystone roles in the overall ecology of the region. Unexplained failures in production following the EVOS have had tragic economic consequences for all the communities of Prince William Sound and surrounding areas. Understanding why these production trends have occurred is central to implementing appropriate restorative measures.

This proposal, in collaboration with the other components of the Sound Ecosystem Assessment (SEA) program for FY95, will provide the Trustees and their agents with information on ecosystem dynamics that can be used to more accurately evaluate damage to injured species and to eventually design appropriate restorative measures. Unless the dynamics of the PWS ecosystem are well understood, actions taken to restore pink salmon, herring and other non-recovering species may be inappropriate, ineffectual, or even damaging to the system. As discussed above, macrozooplankton populations are hypothesized as playing a pivotal role in regulating levels of planktivory and piscivory in the region's consumer populations.

PROJECT DESIGN

The ecosystem approach adopted by SEA in FY94 utilizes a multi-component, integrated project format to quantitatively address hypotheses linking pink salmon and herring production to biological interactions (like growth and predation) that are also strongly modified by environmental factors (temperature, rates of flushing, fronts and eddies, water column stratification). The zooplankton component will be responsible for describing the role that

large and small calanoids, amphipods, euphausiids, pteropods and other dominant pelagic forms play in supporting pink salmon and herring production each year.

A. Objectives

1. Use continuing PWSAC hatchery zooplankton watch collections to describe the timing, duration, magnitude and species composition of springtime upper-layer (20 m) zooplankton stocks in northern, western and southern Prince William Sound.

2. Use shipboard collections of zooplankton to describe how ontogenetic and diel shifts in vertical distribution influence trophic coupling between juvenile fishes and higher-level consumers (in collaboration with Prey/Predator and Juvenile Salmon and Herring Growth studies).

3. Provide direct measures of the species composition and indices of abundance for macrozooplankton swarms and layers detected simultaneously with high-frequency acoustics and optical plankton counting techniques (in collaboration with Nearshore Fish component).

4. Describe how the timing, magnitude and duration of the phytoplankton bloom influences the timing, duration, magnitude and developmental rates of upper-layer macrozooplankton populations (in collaboration with Phytoplankton and Nutrients).

5. Work cooperatively with all other components of SEA to affect formal tests of Lake/River and Prey/Switching hypotheses (in collaboration with Information Services and Modelling).

6. Provide taxonomic assistance (when requested) to ADFG personnel at the Soldotna Limnological Laboratory, and establish a voucher collection of major zooplankters and life stages.

B. Methods

Zooplankton populations will be sampled with nets, including 60-cm bongo nets, 1-m opening-closing NIO nets, 1/2-m closing ring nets, and 1/2-m open ring nets. Most nets will fish 0.333-mm Nitex mesh to assure that the early stages of target populations will be collected. For larger macrozooplankton and micronekton (euphausiids, shrimps, amphipods), a larger mesh - 0.505 or 1.000-mm may occasionally be used.

When appropriate, these nets will be equipped with calibrated flow meters to measure the volumes filtered for each collection. Depth of sampling will be determined using a acoustically-linked net sounder (real time) or time-depth recorder and meter wheel (scope). Discrete depth samples will also be obtained by closing vertical and horizontal tows activated by messenger from the surface. All nets will be carefully rinsed and collections preserved in approximately 10 percent seawater formalin for later laboratory analyses.

In the laboratory, collections will be screened for large or otherwise obvious zooplankters (direct counts) and then subsampled (Folsom splitter and/or Stempel pipet) for the more numerous organisms. To ensure representative sampling, between 100 and 150 animals will be counted. In the case of the larger calanoids, copepodite stages will be enumerated separately. Samples will be analyzed at the ADFG Limnology Laboratory in Soldotna, Alaska, and at the University of Alaska Fairbanks campus.

Sufficient replication will be undertaken to measure field sampling error, and levels of variability associated with day:night, location and cruise (date). Differences will be examined using ANOVA and other parametric and nonparametric statistical techniques.

Important data on continuous seasonal changes in upper-layer plankton stocks (species composition and abundance) will be obtained from the PWSAC hatchery plankton watch program. Samples are collected twice-weekly at locations adjacent to each facility (Evans Island, Esther Island, Cannery Creek and Main Bay) in open 20-m vertical tows. After the hatcheries have measured the settled volumes of these collections, the samples are preserved in 10 percent formalin and stored for analysis at UAF. The hatchery watch program monitors upper-level plankton fields from 1 March through 30 June of each year.

Net samples will be taken aboard ship to identify zooplankton fields associated with layers or swarms of acoustically-censused and optically counted plankton (see Information Services and Modelling component). Sufficient direct sampling will be undertaken to assure the identity of the major species and to provide indices of their abundance and biomass.

A twice-monthly series of closing vertical tows in the deep region near Lone Island will provide profiles of upper-layer and deeper populations to track ontogenetic migrations. Sufficient sampling will be conducted at night from the ship to describe diel behavior and the extent to which day/night vertical movement influences the hypothesized prey-switching mechanism.

Sampling at least twice weekly at designated hydrographic stations along acoustic transects will provide a comparison with hatchery measured zooplankton in all regions. Particular attention will be paid to documenting the period when late-stage oceanic copepods (*Neocalanus* spp.) leave the surface waters (late May, early June). This abrupt decrease in upper-layer macrozooplankton provides a "river-like" experiment each year against which the degree of planktivory or piscivory can be judged. Knowing when the *Neocalanus* spp. descend from the surface is crucial to testing shifts in consumer prey fields.

C. Schedule

October-January	Complete FY94 data analysis.	Begin staging for FY95.
January-February	Complete staging for FY95.	Initiate FY96 planning.
March-July	Conduct FY95 field work.	Continue FY96 planning.
August-September	Analyze field data and prepare preliminary reports for workshop.	

D. Technical Support

Laboratory taxonomic services will be supplied by the project leader's laboratory in Fairbanks. Samples will be delivered to Fairbanks during the season using monthly aircraft charters from Anchorage linked with a van from Fairbanks. Computer services will be available at the University of Alaska Fairbanks and through SEA facilities at the Prince William Sound Science Center. Data archiving will be undertaken cooperatively with the SEA Information and Modelling component.

E. Location

Zooplankton sampling will be conducted in Prince William Sound, with emphasis being given to the central and western areas serving as the rearing and migratory pathways for juvenile pink salmon and herring.

PROJECT IMPLEMENTATION

This project represents a continuation of research begun in FY94 as part of the coordinated Prince William Sound System Investigation, Sound Ecosystem Assessment program under a reimbursable services agreement (RSA) with Alaska Department of Fish and Game. Programmatic structure is in place to continue a second year of study with ADFG sponsorship.

COORDINATION OF INTEGRATED RESEARCH EFFORT

SEA-ZOO is one of 13 projects being coordinated as the FY95 SEA investigation of Prince William Sound Zooplankton information contributes to tests of the Lake/River hypothesis, the Prey/Predator hypothesis, the Herring Overwintering Hypothesis, and to the SEA data base and modelling activity.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	238.1
Commodities	0.0
Equipment	0.0
Subtotal	241.1
Gen. Admin.	6.3
Total	247.4

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SEA: Confirming Food Web Dependencies in the Prince William Sound Ecosystem Using Stable Isotope Tracers - Food Webs of Marine Mammals and Birds

Project Number:	95320I(1)
Restoration Category:	Research (continuation of 94320)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	ADFG
Cost FY 95:	$115,400
Cost FY 96:	$115,400
Total Cost:	$230,800
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Harbor seal

INTRODUCTION

This project contributes to an ongoing effort by Alaska Department of Fish and Game personnel to determine the reasons for the decline of harbor seal and steller sea lion populations in Prince William Sound. In addition, the project seeks to better describe the trophic interactions and trophic status of marine mammals, birds and their prey species in the Prince William Sound ecosystem. The integrating methodology for the range of tasks is the use of stable isotope ratios as natural tracers of carbon and nitrogen transfers through the food webs. Carbon isotope ratios serve as conservative tracers of energy supply between trophic levels (phytoplankton to zooplankton to fishes to top consumers). Seals, cetaceans, birds etc., acquire the isotope ratios in proportion to the amount of food derived from each differing source. This, in turn, is reflected in the composition of body tissues and in keratinous tissues (claws, feathers, baleen, whiskers) as a temporal record when multiple sources of food are consumed over time and space. This allows the discerning of important habitats and food resources in animals that seasonally migrate or undergo periods of hyper- and hypotrophy.

Nitrogen isotope ratios reflect both the food sources and the trophic status of the animal. As nitrogen in food is consumed and assimilated by a consumer, the heavy isotope is enriched by approximately 3°/oo. This enrichment occurs with each trophic step and thus allows the

construction of conceptual models and food webs within the ecosystem and the assignment of trophic status to species for which field data on diet are sparse.

In cooperation with Dr. T. Kline, who is focusing on the fishery resources of the PWS pelagic food webs, we are collecting a suite of samples aimed at allowing us to model the trophic structure of the PWS and the habitat dependencies. Over the past year we have collected offshore forage fishes and tissues from marine mammals. This collection program is now again under way and a large collection of samples for isotope ratio analysis has been obtained. After reviewing the results of this effort, we will focus on areas of data gaps and on refining our understanding of ecosystem processes controlling distributions of isotope ratios.

NEED FOR THE PROJECT

This study focuses on harbor seals, sea birds and the cetaceans of Prince William Sound. Although the major effort is concerned with harbor seals, other marine mammal tissues will be collected opportunistically in cooperation with those agencies handling or collecting those species. Our principal cooperating agency is the Alaska Department of Fish and Game.

This study is closely coordinated with the modeling efforts and the pelagic food web studies being undertaken by the Prince William Sound Science Center personnel. Dr. Kline is responsible for most pelagic collections of food base organisms and is sharing these data to help construct the food web models. Stable isotope data provide an excellent means for validating models and testing food web linkages. This aspect of the work will be cooperative with many components of the SEA project.

PROJECT DESIGN

A. Objectives

1. Collect samples of harbor seal vibrissae through cooperative work with the Alaska Department of Fish and Game in Prince William Sound;

2. Collect samples of harbor seal prey species including forage fishes, salmon and herring in the vicinity of major haul-outs and high population densities. Samples of seal tissues will be collected from native hunters. These samples will be obtained through assistance by ADFG personnel monitoring harvests.

3. Perform stable isotope ratio analyses on tissues and organisms collected during the sampling program. Through the use of carbon isotope data on taxa collected over geographical regions, the presence/absence of isotopic gradients useful in sorting out habitat dependencies will be determined.

4. Through the use of nitrogen isotope ratios in collected taxa, assign trophic status to species in each region. Compare trophic status with predictive models based on conceptual food webs.

5. Determine temporal changes in harbor seal trophic status and food dependencies by comparing isotope ratios along the lengths of vibrissae with prey availability and their isotope ratios.

6. Compare the isotope-ratio derived food web models to predictions by the "lake- river" hypothesis of the SEA project as an independent means of validation.

B. Methods

The primary work will be divided into the sampling program and the subsequent analytical and synthesis tasks. Sampling of tissues for stable isotope analysis has been described for both bulk tissues (muscle, blubber) and temporally variable tissues (whiskers, claws etc.).

Analytical: The samples obtained are dried and powdered for homogeneity and the isotope ratios of carbon and nitrogen determined with a Europa 20/20 mass spectrometer system. The sample is combusted at high temperature and the nitrogen and carbon dioxide gases separated and purified by gas chromatography. These are subsequently led into the mass spectrometer by capillary and the isotope ratios determined.

Synthesis of data:The plots of isotope ratios of carbon and nitrogen along the lengths of vibrissae from sea lions are known to show oscillations in isotope ratios in response to dietary changes over the seasons. As new data with supporting natural history information are acquired, the values at specific intervals will be compared with potential prey for likely matches. These will be compared with observational data and known feeding habits. From this information, sampling can be constrained to the most probable food sources and further directed analyses performed to confirm or deny conceptual food web structure.

C. Schedules

1 Nov 94 - 15 Feb 95	Prepare and analyze isotope ratio samples
15 Feb - 31 March 95	Synthesis and coordination for sampling
Apr - August 95	Field work and sampling
Aug - Sept 95	Post field analysis and planning for 1996

D. Location

The research effort will be conducted in Prince William Sound with contrasting data obtained from samples from the Kodiak Island area and in the coastal Gulf of Alaska near Cordova.

E. Technical Support

This project is integrated closely with the ADFG program on marine mammals in the Prince William Sound and adjacent areas. Other collaborators in NMFS and the University of Alaska will contribute samples from their programs to this project.

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	100.1
Commodities	0.0
Equipment	0.0
Subtotal	107.3
Gen. Admin.	8.1
Total	115.4

SEA: Confirming Food Web Dependencies in the Prince William Sound Ecosystem Using Stable Isotope Tracers - Food Webs of Fishes

Project Number:	95320I(2)
Restoration Category:	Research (continuation of 94320I)
Proposed By:	Prince William Sound Science Center
Lead Trustee Agency:	ADFG
Cost FY 95:	$79,400 (includes $30,000 for data analysis and report writing of FY 94 work)
Cost FY 96:	$176,000
Total Cost:	Unknown
Duration:	2-5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

Stable isotope ratios of carbon can serve as effective tracers of energy supply in Prince William Sound (PWS) due to conservative transfer of carbon isotope ratios between the lower tropic levels (phytoplankton to zooplankton to forage fishes, etc.) up to the top consumers. Isotope ratio analysis of fishes, their prey and their predators can provide insight into habitat usage and assist in quantifying diet derived from various areas. Nitrogen isotope ratios, in turn, provide excellent definition of relative trophic level. The heavy isotope of nitrogen is enriched by about 0.34% with each trophic level and thus can accurately indicate the relative trophic status of species within an ecosystem. The data obtained from these measurements are unique in that they trace material actually assimilated and thus can be used for more accurate ecosystem modeling.

The availability of macrozooplankton forage for salmon, herring, and their predators varies in space and time because of changes in physical processes in Prince William Sound. In the SEA context, the latter is known as the Lake/River processes (SEA hypothesis number 2). When macrozooplankton are not available, macrozooplankton consumers are forced to switch prey, thus predator-prey relationships (SEA hypothesis number 3) shift in space and time. These shifts may represent fundamental changes in the way the PWS ecosystem produces commercial species (i.e. herring and salmon). A better understanding, particularly a quantitative

understanding, is a prerequisite to determining protocols for restoration and recovery of these fishes.

It can be postulated that natural stable isotope abundance of PWS biota will reflect changes in trophic level, food web structure, and primary production, thus providing an independent tool to verify, quantify and model ecosystem processes. The tracer nature of the approach will enable the integration of ecosystem components. It will enable us to monitor both "top down" (predatory) and "bottom up" shifts (food supply) in herring and salmon production.

NEED FOR THE PROJECT

This project is an interdisciplinary effort focused on the food web dynamics supporting top trophic levels in Prince William Sound. The study provides an integrating function to projects focusing on several levels in the food chains and will employ the stable isotope ratios of carbon and nitrogen to trace trophic transfers of these elements between levels. One focus is to build the data base regarding harbor seals whereas the remaining work will seek to build a comprehensive base of isotopic data for the Prince William Sound region. In cases where regional gradients in isotope ratios exist, it may also be possible to identify critical habitats used by marine biota.

Observations made during Leg 1 of SEA cruise 1 of 1994 confirms the concept that Prince William Sound is a pelagic system. The principal midwater predator was pollack utilizing macrozooplankton (euphausids, copepods, squid, and isopods) as prey with occasional use of fishes. Shortly after commencement of pink salmon release at Lake Bay, approximately one in 15 pollack sampled in Wells Passage preyed upon salmon fry, and this predation was exclusive. At this time pollack were widely dispersed in the area suggesting opportunistic feeding depending on encountering salmon.

PROJECT DESIGN

The Stable Isotope study is part of the integrated Prince William Sound System Investigation initiated in FY94. The Stable Isotope study will integrate with virtually all other aspects of SEA and the Prince William Sound System Investigation.

With SEA (other 320 projects):
Salmon Growth and Mortality: Stable isotope data of growing salmon will be compared to available forage fields to ascertain flow of nutrients to salmon. Stable isotope data will be used to assess significance of salmon prey to salmon predators.
Salmon Predation: Stable isotope data of predators will be used to assess their role in affecting salmon and herring recruitment.
Phytoplankton and Nutrients: Stable isotope data of zooplankton will be used to infer changes in the availability and flow of nutrients at the bottom of the food chain.
Zooplankton in Ecosystem: Stable isotope data of zooplankton will be used to assess their

trophic levels and infer the dynamics within the zooplankton-pelagic community.
Information Systems-Modeling: Stable isotope data will be used to determine canonical trophic levels and to reconstruct food webs. This information will be incorporated into models. Isotopes shifts will be used as empirical spatial and temporal inputs.
Physical Oceanography: Stable isotope data of pelagic food webs recorded in temporal and spatial context will be compared with physical oceanographic data to ascertain the relationship of circulation patterns with changes in food web dynamics.
Nearshore Fish: Stable isotope reconstruction of pelagic food chains will be related to predator and prey fields as ascertained by hydroacoustic measurement and netting.
Avian Predation on Herring Spawn: Stable isotope analysis of herring predators will be used to asses role of herring spawn to avian diets in Dr. D. Schell's related studies. The isotopic signature of herring and alternative avian marine prey will be derived in the fish food web component.
Herring natal habitats: Stable isotopic chemistry of natal habitat predators will be used to assess their herring roe predation role.
Juvenile herring growth and habitats: Stable isotopic chemistry of juvenile herring will be used to assess their trophic status in relation to growth rate in different habitats.
Herring predation by humpbacks: The established isotopic database of herring and other potential humpback prey will be used to assess the isotopic chemistry of any humpback samples that become opportunistically available (e.g. from sloughed skin or carcasses).

With related studies:
CWT Recovery: Stable isotope data of salmon with CWT can be used to assess ecosystem utilization by this subpopulation with respect to other species and pink salmon in general.
Pink Salmon Genetics: Stable isotope data can be correlated with genetic data to expose ecological and genetic relationships, e.g. the question of whether carrying capacity effects are the cause of dwarfing in pinks.
Harbor Seals (Trophic Interactions): Stable isotope data from the fish food web component will provide the spatial and temporal background data needed to interpret isotope data of seals.
Trophic-Stable Isotopes: Stable isotope data from this component will support Dr. D. Schell's investigation on seal and avian predation.
Bald eagle diet: Analysis of eagle feathers and samples of eagle prey will rely this isotopic database for interpretation.
Larval and juvenile herring in PWS: Interpretation of isotopic analysis of juvenile herring will augment the larval and juvenile herring study.

A. Objectives

This project has two hypotheses: (1) Carbon and nitrogen stable isotope ratios of biota from Prince William Sound can be used to identify major food sources to top trophic levels and to assign trophic positions to specific consumers of given age classes and habitat; (2) Isotope ratios in consumers provide a means to validate conceptual food web structures, identify trophic variability by individuals within species, and to validate quantified energy flows in ecosystem models.

Specific objectives of this project are:

1. To determine the $^{15}N/^{14}N$ and $^{13}C/^{12}C$ of species collected from the Prince William Sound ecosystem with a focus on those components important to man or important in the food webs supporting these species. Herring and salmon collected from PWS will be matched with regional isotope abundances in prey species (zooplankton, forage fishes) to allocate food sources and to assess trophic transfer efficiencies in specific areas of the Sound.

2. Determine isotope ratios of prey species that are favored by marine mammals in different regions of Prince William Sound. These data will allow estimation of seasonal importance of various prey species and the trophic levels of various seal species in the ecosystem. Past data has shown that there are considerable differences between individual animals of a given age and also changes in trophic level over the life span. Drs. Schell and Kline expect to consult with each other frequently to exchange data to develop this and other parts of the stable isotope program.

3. Synthesize the data obtained in context with conceptual food webs to validate feeding models and expand the natural history information.

4. Contribute stable isotope results to formal tests of the Lake/River-driven prey switching hypothesis developed by SEA to explain pink salmon and herring production trends.

B. Methods

Strategy

1. Collect synoptic samples from the greater PWS using the available fleet (ADFG et al.) sampling effort. Under other SEA projects, these same individual samples will receive additional analyses (e.g. stomach content analysis) in addition to the stable isotope analysis described.

2. Post-season analysis will reveal where macrozooplankton were and were not available to consumers (this will be discussed among collaborators at the fall workshop)

3. Conduct a posteriori tests of trophic level and food web shifts on samples from appropriate sites using the natural stable isotope methodology

Analytical methods

The methodology involved in the isotopic analyses and the interpretation of the data are well established and documented in several publications resulting from prior work of the Principal Investigator. The UAF Stable Isotope Facility has three isotope ratio mass spectrometers including a new automated system which facilitates faster sample processing and allows more replication in small samples.

Sampling protocols in the field for zooplankton and fishes are well established and will be used in any future sampling. Predator isotopic data will be compared with values obtained from prey species in the same habitats. Where samples of prey species are missing or few, we will try to select proxy samples from the same area (zooplankton, benthos) which will enable a similar comparison. After the isotopic values are in hand, we will synthesize the data with existing data on isotope ratio values (published and unpublished) to establish a trophic model.

C. Schedules

Fall 1994	Conduct fall field sampling cruise on Alpha Helix. Subsampling and preparation for isotopic analysis will be continued as time permits.
Fall/Winter 1994-95	The collected samples will be analyzed for $^{15}N/^{14}N$ and $^{13}C/^{12}C$ and a conceptual trophic and food web model assembled for the Prince William Sound ecosystem with the focus on commercially important species.
Spring/Summer 1995	The data obtained will be used in the preliminary models to identify data gaps and to direct summer 1995 sampling operations. Summer sampling will be undertaken in close cooperation with other projects to optimize sampling and to help validate/test other models of ecosystem interactions by species of interest. Manuscripts describing the results will be prepared for the open scientific literature. Planning for FY96 will take place.

D. Location

The sampling will be carried out throughout PWS as part of the cruise plan. Analytical work will be carried out using the stable isotope facility at UAF. Sample preparation for stable isotope analysis and data interpretation will take place at the Prince William Sound Science Center.

E. Technical Support

Alaska Department of Fish and Game - Vessels and sampling
University of Alaska Stable Isotope facility - Dr. D. Schell will receive prepared samples from Dr. Kline. Dr. Schell will supervise the isotopic analysis and reporting of data to Dr. Kline.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	74.4
Commodities	0.0
Equipment	0.0
Subtotal	77.4
Gen. Admin.	2.0
Total	79.4

Sound Ecosystem Assessment (SEA) - An Ecosystem Study for Prince William Sound: Information Systems and Model Development (SEADATA)

Project Number:	95320J
Restoration Category:	Research (continuation of 94320J)
Proposed By:	Prince William Sound Science Center
Lead Trustee Agency:	ADFG
Cooperating Agencies:	DOI, NOAA
Cost FY 95:	$836,200 (includes $265,700 for data analysis and report writing on FY 94 work)
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2-5 years
Geographic Area:	Prince William Sound and North Gulf of Alaska
Injured Resource/Service:	Multiple resources

INTRODUCTION

The Information Systems and Model Development Project (SEADATA) for FY95 is one of thirteen projects within the Sound Ecosystem Assessment (SEA) program. It will be a continuation of the FY94 project 94320J, begun in April 1994.

The Sound Ecosystem Assessment (SEA) Initial Science Plan and Monitoring Program describes the manner in which pink salmon and Pacific herring, among all marine species exhibiting injury following *EVOS*, are economically and ecologically unique. The SEA Plan presents a set of hypotheses regarding the key ecosystem components and processes that may regulate the recovery of these species. The resultant SEA Program is a coordinated collection of projects, most of which address one or two key ecosystem components encompassing the ocean environment, phytoplankton, zooplankton, nearshore and pelagic fish populations, and shore birds. These projects have been designed to maximize the simultaneous measurement of different system components and then to combine all the resultant information into a common data system. The ultimate objective is to achieve an integrated ecosystem representation of processes affecting recovery of the injured species. It is this objective that defines the purpose of the SEADATA project.

SEADATA will develop two ecosystem representations for SEA:
Descriptive model representation: A spatially and temporally sparse, observationally determined representation of the state of the system.
Numerical model representation: A more complete system representation by means of data along with quantitative descriptions of relations among system components.

In addition, the SEADATA project will undertake two subprojects to reduce the impact of sparse sampling on the quality of the representation and to utilize optimally the monitoring effort: near realtime field communications and enhancement of monitoring scope per unit of monitoring cost.

Descriptive Model Representation
The descriptive model representation is conceptually the collection of all observations from SEA and from other data sources. The FY94 SEA projects are now acquiring the following information about the state of the system (items marked with * will be operational later in FY94 or in FY95):

From the SEA field survey (buoys, surface vessels, aircraft*):
- ocean current vectors, temperature, salinity, sea state, fronts
- plankton densities, distribution, species and cohort composition
- fish densities, distribution, size and species composition, diet
- bird and mammal counts, distribution, diet

From the satellite downlink site:
- sea surface temperature (Advanced Very High Resolution Radiometer - AVHRR)
- ocean color and derived values (Sea viewing Wide Field of view Sensor -SeaWiFS*)
- meteorological data*

The descriptive model will be realized as an online digital data system with a well integrated library of query and analysis software tools specifically selected and adapted for mutivariate, three-dimensional, time varying marine system data. This product can be thought of as a three-dimensional GIS (geographical information system) for the SEA program. The resultant comprehensive ecosystem database for Prince William Sound will have near realtime, online availability for all SEA investigators. In addition, SEA database products will be accessible electronically to the local community, including fishermen and citizens concerned about the current status of the Sound and the progress of restoration efforts, as well as to members of the Trustee Council and scientists worldwide via the Internet.

Numerical Model Representation
A numerical model representation refers to a set of quantitative relations between system components. Whereas the foregoing descriptive model presents the state of the observed system, a numerical model describes the functioning of the system. This information is fundamental to understanding and managing the recovery of injured species.

A first step toward such a model is the identification of the essential components of the system (the subsystem) and the relations between these essential components. For example, the river-lake hypothesis proposes specific components (macrozooplankton density, fry density, predator densities, ocean currents) and relations (foraging behavior, advective dispersion, annual vertical migration) as the essential subsystem regulating pink salmon fry predation over a specific time interval. In this case a numerical model would relate ocean currents to macrozooplankton distribution and relate macrozooplankton density and fry density to predator foraging behavior. Once such relations are validated they provide the means for quantitatively assessing how this subsystem affects recovery through changes in ocean current patterns or changes in predator populations. Such an assessment can address changes occurring naturally and, in the case of predators, changes in fisheries policies.

In addition, the accounting for fry survival through changes in ocean currents transfers the variability of a biological component to that of a physical system that is essentially deterministic. The use of only observational ocean current information is limiting in that the observations are sparse and the determinism of ocean circulation and maturity of circulation models are not exploited. Consequently, the SEADATA project first addresses the implementation of an ocean model as a fundamental component of the numerical models, whether statistical or deterministic, of the processes regulating recovery.

Numerical models are conveniently classified as ocean models, physical-biological models and nekton models. The first is deterministic and forcing on the second and third. Physical-biological models apply to those marine species whose transport is advective. Nekton models apply to fish. Physical-biological models and nekton models are fundamentally dependent on an ocean circulation model. The longterm strategy for numerical model implementation is the following. During FY95 and 96, the primary effort will be directed toward the ocean circulation model with only essential and collaborative activities in the other two modelling areas. Once an ocean model is online, efforts in the other two modelling areas will begin in parallel, with approximately equal effort allocated.

Near Realtime Field Communications

The sparseness of the sampling can in part be offset by adaptive field sampling strategies. Because of temporal variability, adaptive strategies require that new information be added in near realtime. Consequently, a companion objective of the SEADATA project for FY94 and beyond is a near realtime data communication system linking all sources of data, all data analysis sites, and all adaptive survey systems.

Monitoring Technologies

The sparseness as well as the cost of sampling can be reduced through the use of indirect measurement methods. Hydroacoustics for fish and satellite remote sensing for sea surface temperature have been used in SEA from the outset. During FY94 a towed platform (Chelsea, Ltd., Aquashuttle) that automatically follows a periodic depth varying path was added. All sensors, such as a CTD, carried on this platform periodically traverse a depth interval of the water column. A new indirect system, the optical plankton counter from FOCAL, Ltd., was also added in FY94. An ongoing objective of the project is to adapt such methods for use in

SEA when their use is cost effective. Autonomous systems are also an objective. During FY94 one or two buoys will be configured with basic monitoring sensors and with transmitters. These will be part of the near realtime data system. For FY95 the goal is to develop implementation plans for the addition of high frequency acoustics to the Aquashuttle and for the use of acoustic tomographic methods to utilize buoy stations more efficiently.

NEED FOR THE PROJECT

SEADATA functions as both a collaborator and a facilitator for all other SEA projects. It must collaborate with each project with respect to survey design, methods, data formats, reduction procedures, and data analysis; and it must facilitate communications, data transmission, data ingestion, data qualification and security, and the inclusion of project data into the broader framework of all SEA results. These functions are a principal mechanism in the SEA program for ensuring the development and execution of well coordinated surveys and the coordinated interpretation and dissemination of results.

Beyond this support role there is another central function: SEADATA provides the mechanism by which data from the separate SEA projects becomes an ecosystem assessment. Whereas the other individual SEA projects address issues associated with specific system *components* or processes coupling specific system components, SEADATA implements the SEA Plan *at the system level.* The project is responsible for integrative efforts including spatial and temporal coordination, summarization and visualization of data for multiple trophic levels and computation of trophic level interaction rates. In addition, a serious approach to model formulation is required to obtain quantitative information about recovering species, rates of recovery, and potential effects of restoration approaches upon recovery. Part of the mission of the SEADATA project is to select and apply appropriate models, using data derived from the SEA investigations and other sources, in order to obtain quantitative representation of subsystem function in Prince William Sound. Such representation is a prerequisite to the ability to understand and predict the impact of significant perturbations to the system, whether natural or man-made.

PROJECT DESCRIPTION

The FY94 project description for project SEADATA (94320J) outlines five major subprojects:

1. Field data communications;
2. Data management;
3. Descriptive model;
4. Numerical models;
5. Sampling technologies.

This FY94 subproject structure will be followed in FY95 and the task enumeration below is identical to that of the FY94 Detailed Project Description. The FY95 project plan, however, reflects changes in emphasis resulting from the completion of FY94 infrastructure and resource milestones (hardware, software, local and wide area network communications, personnel, and

collaborative agreements). The FY95 plan also reduces operating capabilities relative to those of FY94. By this means the same range and types of services are sustained over twelve months at a constant project cost.

1. Field data communications

During FY94 the core components and licenses for a UHF packet-radio realtime data communication system and repeater network will have been completed. Baseline functionality will have been established in three application areas: a single survey vessel, a single buoy, and an autonomous system. Given this status, it is appropriate technically to consider expanding this capability to additional survey vessels and to begin planning for a network of realtime *in situ* stations. However, to contain costs for FY95 this subproject will continue at a much lower level. No further in situ realtime stations will be added. No major effort for an expanded ship of opportunity program will be undertaken. The FY95 effort will focus on survey vessels. To the maximum extent possible, survey vessels will be fitted with realtime send and receive data communications, using the UHF repeater approach developed in FY94, to support data and model-based adaptive sampling schemes.

There will, in addition, be an effort to track and to utilize new developments in the Prince William Sound region as they appear. During FY95 cellular phone service will become available, but for a limited region. Also, a privately funded communications satellite has been announced. The costs and benefits of such new technologies will be evaluated.

2. Data management

All data-related tasks are collected into the data management project which, in turn, has seven subprojects.

2.1. Coordination: This subproject will continue to provide coordination of the data management project with the needs and interests of the SEA participants and the Trustee Council.

2.2. SEA data services: In FY95, data services will have achieved basic functionality objectives for mass storage, CD-ROM mastering, data ingestion, basic security, data quality control, and data access procedures. For most areas the effort will continue at a maintenance level. Implementation of a redundant array mass storage system will be postponed until FY96. For FY95 the focus will be on development of a scientific database system. During FY94 the Prince William Sound Science Center and the Advanced Visualization Laboratory, University of Maryland, were awarded dual grants by Xidak, Inc., of Palo Alto, California, of their scientific database and data server software (list value $50,000 per site). Under this grant, the parties will undertake a cooperative development effort to address database and data server issues specific to the SEA Program. Xidak in addition is supporting a graduate student engaged in the project. This grant and the codevelopment effort is significantly accelerating the implementation of a scientific data system for SEA.

2.3. Site access: The subproject will continue to maintain both wide area and the local area connectivity. Wide area communications, including access to the Internet, are essential not only to the SEA investigators but also to the larger community served by and interested in the restoration effort, by providing for electronic communications, online data access, distributed databases, and network conferencing. In addition, this communication is necessary for activities such as the codevelopment with Xidak and the University of Maryland. Wide area and local area communications are also closely coupled with the realtime data communications project and both systems are required to realize realtime data dissemination and adaptive field sampling strategies. However, for FY95 the speed of the wide area network will be reduced from 256 Kbps to 56 Kbps to achieve cost containment objectives. This speed reduction will modestly affect data transfer but will more significantly impair interactive network communications. Activities associated with remote sensing, remote data sources and historical data will increase during FY95 as computer and communication access is fully implemented.

2.4. Remote sensing data: This effort will continue to provide Advanced Very High Resolution Radiometry (AVHRR) for sea surface temperature (SST) and acquire Sea viewing Wide Field of View Sensor (SeaWiFS) images for ocean color data. There are three subprojects that will be ongoing: 1) Downlink and archive, providing for data collection from the satellites; 2) SEA data product, reviewing available images for use in SEA; and 3) Distribution, adding the image data to online SEA databases. This subproject will be conducted by Dr. David Eslinger in collaboration with the Geophysical Institute. To realize cost containment objectives, a realtime SeaWiFS license will not be purchased; hence data will not be distributed within SEA in near realtime but rather with the two week delay imposed by proprietary restrictions. Further, remote sensing data services cannot be supported for the full twelve months.

2.5. Remote data sources: These are data sources for current data other than SEA data and satellite data, including detailed meteorological data. In FY95, meteorological data has increased significance in support of the development of the ocean circulation model.

2.6 Historical data: The objectives of this subproject are to (1) assemble a digital index of historical data relevant to SEA; (2) establish an off-line (tape) and low-availability on-line (CD-ROM) data base for historical data available in digital form; and (3) select high priority data resources and complete necessary data processing to integrate these data in the SEA database. The primary investigator for this work is Dr. Gary Drew of the National Biological Survey, Anchorage. He will collaborate with Dr. David Eslinger, UAF, to coordinate the historical and near realtime data sets. Progress was made toward these objectives in 1994, but further historical data remains to be collated.

To achieve cost containment objectives, the following tasks have been postponed to FY96: Historic AVHRR satellite imagery will be acquired primarily from the NOAA archive in Washington, D.C. A time-series to date back to 1985 will be constructed over 13 biweekly intervals April 1 through October 15 annually. Imagery will be processed to provide data on temperature (marine and terrestrial) and indices of primary productivity (terrestrial only). These data layers may be integrated with other data sources, e.g. fish returns, marine primary productivity, etc., to identify

interactions between terrestrial and marine ecosystem components in Prince William Sound. Data layers will be transferred to the Prince William Sound Science Center for master archiving and wide area access.

2.7. SEA data tools: This subproject will provide accessibility and utility of the SEA data, models, and forecasts for the SEA investigators and for those using the results of the investigations. These will include browse tools, help tools, and higher level research tools. During FY94, key software infrastructure was brought online. These efforts will increase during FY95 with cost-sharing from the Xidak grant. The Xidak data server incorporates a basic set of data query tools as well as a programming environment. It is designed to interface easily with existing custom SEA software and high end scientific data visualization packages.

3. Descriptive model and interface

This subproject addresses (1) the description of the state of the system given measured data and an incomplete abstract definition or model of the system, and (2) an interface to the data in terms of the system variables. The overall objective is to continue development of an interface to existing data that provides for display, query, and the computation of further variables that are functions of the state of the system.

3.1. Visualization: Visualization interfaces will be developed relating temperature, salinity, ocean currents, number and biomass distribution with respect to volume, size, cohort and sex. The spatial domain of definition for each of these as system variables is the three-dimensional region of Prince William Sound and the North Gulf of Alaska.

3.2. Support for adaptive sampling: Adaptive field sampling strategies require accurate and near real-time information. This subproject will provide (1) near real-time communications; (2) transmission of reduced image format data to the field and decision aid tools for field use; and (3) short term statistical and numerical model forecasts.

4. Numerical models

The work of this subproject is the development of numerical models. The ultimate objective is the capability to understand quantitatively and to simulate the time evolution of processes regulating the populations of pink salmon and Pacific herring in Prince William Sound during their early life stages. Modeling objectives for 1995 are continued development and testing of (1) ocean circulation model; (2) physical-biological model; and (3) model frameworks for observations of feeding, dispersion, mortality, and growth.

4.1. Ocean circulation model: During FY95, Dr. Chris Mooers, RSMAS, will begin implementation of the Mellor ocean circulation model for Prince William Sound. This will provide SEA with a continuously running, three dimensional circulation model driven by atmospheric forcing, tides, river run-off, and remote forcing along open boundaries. The model output will be accessible over the Internet. While it is feasible to consider a first order version of the model running during the middle of FY95, the project schedule is instead for early in FY96. Under this

project schedule the first half of FY95 will be devoted to establishing data bases for boundary conditions and near realtime and climatalogical forcing. To establish the critical links between the ocean circulation model and observed physical and biological processes from the FY94 field survey, there will be extensive collaboration with Dr. David Salmon (SEA-OCEAN), Dr. Gary Thomas (SEA-FISH), and Dr. David Eslinger. Model development will commence during the second half of FY95.

4.2. Physical-biological model: Recent advances in ocean circulation models and their numerical solution have led to efforts to model and simulate the time evolution of planktonic populations in a subsystem. These time evolution models are often called physical-biological models. They are hybrid models combining ocean circulation models with biological models for foraging, natural mortality, regeneration. These models can be extended to include planktivore grazing with the addition of models for the foraging and dispersion of the planktivores. These are the models needed for the river-lake hypothesis. For 1995, this modeling effort will continue at a somewhat curtailed pace so that emphasis can be placed upon the completion of the ocean circulation model, with a significant part of the effort here supporting that collaboration. Dr. David Eslinger, UAF/IMS, will be contracted to conduct this effort, in coordination with the SEA projects for in situ measurements of the phytoplankton population and nutrient concentrations (Peter McRoy and David Eslinger) and zooplankton distribution (Ted Cooney).

4.3. Nekton ecological processes: The observed distribution of nekton can be modelled as a response to the present distribution relative to alternative distributions. A simple formulation consists of a "preference" measure for an environmental variable such as temperature, light level, or temperature gradient (thermal front). There is feedback in the case of a predator and its prey both responding to some combined measure of rates of feeding and rates of predator attack. These models will draw upon the collective knowledge of SEA, especially the findings of the SEA-FISH project, regarding the distribution and behavior of specific populations, the interpretation of observed overlapping distributions, and results from field studies of diet and foraging. Dr. Doran Mason, University of Wisconsin Limnology Laboratory, will collaborate with Dr. Vince Patrick, Dr. Gary Thomas and Mark Willette (ADFG) in the development of distribution-feeding-growth models. Dr. Ricardo Nochetto will also collaborate as an expert in numerical methods for the classes of equations used in this project. For FY95 this work will proceed at a somewhat curtailed level in order to focus resources on the completion of the ocean circulation model.

5. Sampling technologies

The search for techniques that will improve the cost efficiency of monitoring and reduce the sparseness of sampling is shared by all projects in SEA. Whereas many new methods fall within the usual boundaries of specific disciplines, others do not. In particular, methods that significantly increase the scale of coverage for a fixed measurement effort often involve the use of nonconventional sensors, signal processing, and inverse methods. In such cases evaluation and initial testing is often easiest from within the multidisciplinary scope of the SEADATA project. Consequently, an ongoing objective of this subproject is the search and review of candidate new technologies. During FY94 the Chelsea, Ltd. Aquashuttle platform equipped with the FOCAL Technologies, Ltd. optical plankton counter was introduced and initial sea trials conducted. The

integration of these devices into the SEA survey plans will continue in FY95. In addition, an implementation plan will be developed, in collaboration with the SEA-FISH project, for the use of the Aquashuttle with high frequency acoustic sensors.

A second subproject for FY94 is a review of the applicability of acoustic tomography at selected sites in Prince William Sound for the autonomous acquisition of nearly continuous, near realtime measurement of sound speed and current velocity along a planar region between fixed buoy stations. This review is being conducted by Dr. C. A. Berenstein. It has received the additional services of Mr. D. Lindsay from July through September 1994, at no-cost to the Trustee Council through National Science Foundation support for Mr. Lindsay. In addition, a no-cost collaborative effort has been initiated with Dr. A. Tolstoy of the Naval Research Laboratory. If the FY94 review is positive, work will continue in FY95 to formulate a cost-effective implementation plan and conduct simulations.

PROJECT IMPLEMENTATION

This proposal is a continuation of FY94 project 94320J, SEA Information Systems and Model Development (SEADATA). The lead agency for the project is the Alaska Department of Fish and Game (ADFG), which, as a Trustee Council agency, receives funding from the US District Court upon approval by the Council. A second agency, the National Biological Survey (NBS), will participate in a collaborative role within the SEADATA project. The work will be conducted cooperatively by a collection of organizations under subcontracts from the University of Alaska Fairbanks (UAF) in accordance with a research service agreement between UAF and ADFG. The participating organizations are:

Prince William Sound Science Center (PWSSC), Principal Investigator and Project Leader: Vince Patrick, PhD. The PWSSC is the home base for several SEA projects and serves as the geographic, strategic and organizational headquarters of the SEADATA effort.

UAF Institute of Marine Science, Principal Investigator: David Eslinger, PhD

Rosenstiel School of Marine and Atmospheric Science (RSMAS), Principal Investigator: Chris Mooers, PhD

Advanced Visualization Laboratory, Principal Investigator: Ravi Kulkarni, PhD

University of Maryland (UMD), Principal Investigator: Carlos Berenstein, PhD

COORDINATION OF INTEGRATED RESEARCH EFFORT

SEADATA is an integral part of the 13 projects comprising the SEA program, which was conceived from the beginning as a multidisciplinary, interagency, collaborative study. An essential aspect of SEADATA is its inherent coordinating role within SEA. By design SEADATA serves as the central aggregator of SEA survey results, providing a common data pathway and a unifying planning mechanism fundamental to execution of a coordinated survey effort.

In addition, the SEADATA project itself is multidisciplinary and multi-institutional in character. Its technology choices draw from a broad interdisciplinary basis to incorporate tools and resources that

are commonplace in one discipline but new in others—visualization software from space physics; data systems from satellite systems and meteorology; modelling capabilities from developments in oil spill management systems; advanced internetworking technologies; and numerical methods from semiconductor design. Such interdisciplinary incorporation of state of the art technology has been possible through development of a collaborative research plan involving scientists from half a dozen academic, government, corporate or private institutions across the USA and Canada. In consequence parts of SEADATA are shared with ongoing research and monitoring activities elsewhere, and the Trustee Council effort benefits from prior and concurrent research and technology investments at other sites.

The goals and objectives described in this project plan are the result of months of close collaboration with citizens of the region served by the study, on-site resource managers, scientists based in the community and at the University of Alaska, and administrators responsible for the oversight of the restoration resources. Close communications will be maintained with all of these parties during execution of the project, through regular reporting and via Internet and dial-in access to SEADATA applications and products. Coordination among the cooperating institutions and research groups will be enhanced by on-site visits, regularly scheduled reports and electronic briefings, and online interactive network conferencing.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	812.4
Commodities	0.0
Equipment	0.0
Subtotal	815.4
Gen. Admin.	20.8
Total	836.2

Sound Ecosystem Assessment (SEA), An Ecosystem Research Plan for Prince William Sound -- Observational Physical Oceanography in Prince William Sound and the Gulf of Alaska (SEA OCEAN)

Project Number:	95320M
Restoration Category:	Research (continuation of 94320M)
Proposed By:	Prince William Sound Science Center
Lead Agency:	ADFG
Cost FY 95:	$577,800 (includes $138,700 for data analysis and report writing of FY 94 work)
Cost FY 96:	$525,500
Total Cost:	Unknown
Duration:	2-5 years
Geographic Area:	Prince William Sound and north Gulf of Alaska
Injured Resource/Service:	Multiple resources

INTRODUCTION

The Sound Ecosystem Assessment program (SEA) evaluates changes occurring in the Prince William Sound (PWS) ecosystem in the context of groups of interacting species. The knowledge gained by implementing SEA is vital to determining the feasibility of, and the approach to, restoring many resources and services injured by EVOS. Resources addressed by SEA include pink salmon, herring, and the principal species interacting with these fishes. These pelagic organisms support a host of birds and mammals, some which have also been described as injured species. Services addressed include subsistence, commercial fishing, recreation and tourism, and passive use. While SEA is primarily a monitoring and research activity, this program will also provide support for other EVOS Trustee Council programs (i.e., informing management to promote a healthy ecosystem, increasing public information about the state of the ecosystem). Plans for SEA were developed with the encouragement and support of the EVOS Trustee Council to provide an understanding of important ecological influences on injured resources and services. The initial phase of SEA was funded during the last half of FY 1994.

NEED FOR THE PROJECT

The Sound Ecosystem Assessment (SEA) plan provides a framework to improve our predictive capabilities of key animal population abundance in Prince William Sound (PWS). In order to formulate a responsible and effective strategy for the restoration and recovery of an injured resource or service, it is critical to understand how each component of the system functions in relation to the entire ecosystem. The SEA Plan broadly focuses on the recovery of the ecosystem as well as individual components. Since climate in the PWS region is a major controlling factor on biological populations, it is necessary to understand the linkages between the physical environment and the living resources. The Physical Oceanography project (SEA OCEAN) will collect and analyze data fundamental to a better understanding of the natural variability in Prince William Sound. A knowledge of the prevailing climatic conditions and how they act to constrain biological populations in the *Exxon Valdez* Oil Spill (EVOS) impacted region is a major goal of this project.

An understanding of how to best restore resources damaged by EVOS hinges upon knowledge of both how the PWS ecosystem functions naturally and how it functions under stresses induced by human beings, such as the EVOS. In order to understand how perturbations such as EVOS and the effects of salmon hatcheries propagate their effects through the ecosystem, we must determine the natural variability of the ecosystem. The EVOS Trustee Council has adopted an ecosystem approach to the restoration of injured resources and has initiated ecosystem level studies aimed at understanding how the PWS ecosystem functions. This project is a continuation of the ecosystem level studies that are aimed at guiding restoration efforts. In addition, at recent restoration workshops held by the Trustee Council, it was agreed that an essential element of all restoration research and monitoring projects is a study aimed at characterizing the physical environment in terms of oceanography and meteorology. Therefore, the physical oceanography project is a cornerstone of the entire suite of marine ecosystem level studies. It is essential for placing the PWS ecosystem within the broader context of the climatic factors that constrain both its structure and function.

Pacific herring and pinks salmon, two of the most important commercial and ecological species in PWS are shown to be injured and not recovering. Environmental factors and physical ocean conditions are critical in controlling the juvenile growth, mortality and ultimate recruitment as adults of these two species. The availability of forage for salmon, herring and their predators varies greatly in PWS, as do the changes in the physical and chemical oceanographic environment. The transport of larval salmon and herring is influenced by wind and current-driven processes and their availability to predators is a function of those processes. The growth and survival of these two species are strongly controlled by fluctuations in physical conditions. A better understanding of the physical environment and ecosystem through the study of the physical oceanographic components is necessary to determine protocols for restoration and recovery of these fishes and related species. Recovery of these fishes is, in turn, crucial to the restoration of the species which feed upon them.

Major hypotheses in the SEA program include the idea that the physical environment of PWS and the Gulf of Alaska (GOA) is the major determinant of natural variability in the ecosystem.

In particular, changes in the large scale advective regime in PWS are thought to constrain growth and survival of juvenile pink salmon through both differential availability of important food resources (calanoid copepods) and a prey switching mechanism by which presence or absence of these resources causes potential pink salmon predators to feed more heavily on either pink salmon or copepods. The elucidation of the physical oceanographic structure of PWS, and its space/time variability, is critical to understanding how the ecology of the region changes in response to natural perturbations such as ENSO phenomena and large scale long term temperature fluctuations associated with the 18.6 year nodal tide. This project will characterize and monitor major physical processes that constrain the ecology of pink salmon, their predators, and their prey in PWS. Information concerning the origin, modifications, and fate of water masses that constitute both the surface and deep waters of PWS and determine their biology will be obtained in PWS/GOA. Large scale physical oceanographic measurements will consist of temperature, salinity, and ocean currents (derived density and baroclinic ocean currents) obtained from conductivity/temperature/depth and acoustic doppler recording instruments. Meteorological measurements will include air temperature, precipitation, wind speed and direction and derived products that relate atmospheric forcing to oceanic structure, properties and circulation. Fine scale oceanographic measurements will include determination of horizontal and vertical physical structures (e.g. thermocline, pycnocline, fronts, eddies, tidal rips, shear zones). This study will be closely coordinated with all components of SEA. In particular, both chemical (silicate, phosphate, nitrate, oxygen) and biological data (phytoplankton, zooplankton, ichthyoplankton) will be used as physical oceanographic tracer fields in the determination of how physical processes in PWS act to control the fluctuations of ecological populations. In addition, measurements made in the observational physical oceanography program will be useful in other EVOS Trustee Council funded research efforts aimed at understanding interactions between other species and their environment.

PROJECT DESIGN

A. Objectives

1. Determine the space/time variability of atmospheric and oceanic processes and structures within PWS and the GOA. Atmospheric processes of interest will include winds, precipitation and temperature, while the focus in the ocean will be on currents, fronts, eddies, tidal rips, thermocline, halocline, and changes in properties (both physical and chemical) of both the surface and deep waters.

2. Determine the relationships and interactions between atmospheric forcing (winds, storms, long term temperature changes) and wind and buoyancy driven ocean currents in PWS/GOA.

3. Determine how the relationships described in 2) act to retain or disperse major food resources for ecologically important species within PWS.

4. Ascertain the large and fine scale oceanographic structure and the major climatic cycles (ENSO, nodal tide) and events (e.g storms) that affect PWS/GOA within the context of the space/time distributions and changes in abundance of important populations in these regions.

B. Methods

Large Scale Physical Oceanography in Conjunction with the River/Lake Hypothesis

The large scale measurements made in the SEA physical oceanography program are crucial to testing the validity of the river-lake hypothesis. Baseline information concerning the water masses that constitute the externally advected surface and deep waters of Prince William Sound will be obtained from transects in the Gulf of Alaska. Local freshwater input to PWS will be estimated from stream measurements and a hydrologic model. These oceanographic transects will cut across the Alaska Coastal Current (ACC) and the deep shelf waters in the northern Gulf of Alaska. Measurements taken during the 1994 field season (as of July) include CTD, zooplankton and chemical sampling. Physical information will consist of temperature, salinity, density profiles obtained from conductivity/temperature/depth (CTD) profilers, ocean current velocities obtained from acoustic doppler current profiler (ADCP) measurements and (geopotential) dynamic heights calculated from CTD data. ADCP backscatter will also be experimented with in SEA investigations to ascertain its effectiveness in augmenting biological (i.e. net capture) measurements of zooplankton distribution and abundance. Chemical signatures (nitrate, silicate, and phosphate, possibly tritium or other tracers) of ACC and shelf derived waters will be obtained from Niskin bottle samples mounted with the CTD on a rosette. Conservative nutrient based tracers will be computed from the nutrient distributions because of their utility in ascertaining distinctions between water masses. These tracers will be particularly useful for discerning deep water characteristics. In addition, the biota found in ACC waters are distinct from those found on the deep shelf (i.e. neritic versus oceanic) and will be used as tracers to further discern differences between water masses that enter the Sound via Hinchinbrook Entrance (HE).

Transects across HE, southwestern PWS, Montague Strait (MS), and regions of the central Sound will be made to determine the advective regime within PWS. Sampling will encompass the entire water column in shallow regions or down to about 775 m in the deeper areas of the Sound. This will allow for the determination of both surface water flushing patterns (and rates) and deep water renewal processes in the Sound, as well as the abundance of associated deep and near surface zooplankton assemblages. Sampling will include CTD, ADCP, and chemical measurements (Zooplankton sampling techniques are described in the zooplankton sampling program, *SEA-ZOO: The Role of Zooplankton in the Prince William Sound Ecosystem, 95320H*). Ocean current sampling will be conducted over the course of several tidal cycles in order to determine the relative contribution of tidal currents to the net flow regime. In the southwestern Sound, physical and zooplankton sampling will be conducted for all passages that drain out of PWS. ADCP and CTD transects will be run across Elrington and LaTouche Passages as well as across Port Bainbridge to include (presumably) outflow from Bainbridge and Prince of Wales Passages. Further north, transects will be run across Knight Island Passage and MS to determine the relative contributions from these area. Physical and zooplankton sampling in the

southwestern Sound will be conducted in close coordination with predator and juvenile salmon sampling. Time series of oceanographic parameters begun in 1990 during the CFOS program and the 1994 SEA field season will be continued during the SEA 1995 program. These time series are extremely valuable in that they are the only ones of this resolution and duration for PWS.

Four CTD instruments will be deployed on vessels in PWS. One CTD will be towed on an underwater towing platform in western PWS, that is mounted with a fluorometer, optical plankton counter and a dissolved oxygen sensor. One CTD is mounted on a rosette for use in conjunction with chemical oceanographic sampling. The two other CTDs will be used for fine scale surveys in conjunction with salmon predation and growth studies in both the northwestern and southwestern Sound. The fine scale sampling is described below in a separate section. Initially one ADCP will be deployed aboard a vessel that will sample in western PWS, concentrating on the region of outflow to the GOA (which includes MS). This vessel will also work frequently in HE and the adjacent GOA to characterize flow in the ACC, determine how much of this flow is deflected into PWS, and determine the shelf water contribution into PWS. Chemical and biological sampling will provide data to assist in determining the advective regime and its source waters in the Sound in both time and space. Station spacing along transect lines will be approximately 2 nautical miles. A second ADCP will be utilized in a moored deployment in the HE region of PWS. A CTD will also be attached near the bottom of the mooring for characterizing influxes of bottom water from the GOA into PWS. The moored deployment will begin in FY1994 and will be used over the winter months to determine the flow field in response to intense atmospheric forcing, and the presence/absence of biological scattering layers. The period of deployment will be four to six months, after which the data will be retrieved and the instruments redeployed for a similar duration. The feasibility of real time data links from the mooring to Cordova is being investigated during 1994. The principal and most intense sampling periods for CTD, ADCP and chemical measurements will occur from April through July, although measurements will also be made in the fall and winter months in order to determine how the regional oceanography and meteorology fits into the larger scale variability (i.e. interannual variability). The months of April and May will be sampled most intensively in HE, the GOA, MS and the central Sound, since the correlations observed between zooplankton abundance and atmospheric forcing are strongest during these months.

Meteorological data will be obtained in a nearly continuous fashion from the CFOS meteorological buoy moored within PWS. This buoy is also equipped with oceanographic sensors (fluorometer, thermistor chain). Satellite tracked drifting buoys will also be deployed in PWS and the ACC periodically in order to track surface ocean circulation patterns and their evolution throughout the year.

Vessels of opportunity will also be employed in obtaining large scale physical and biological oceanographic data in the SEA program. During FY 1994, a thermosalinograph was installed on the tanker T/V *Keystone Tonsina* as part of the SEA physical oceanography program. This vessel transits PWS and the Gulf of Alaska four times a year and will provide continuous measurements of temperature and salinity through these regions. In FY 94 the U. S. Coast Guard allowed us to use the cutter *Sweetbrier* for deploying oceanographic equipment, including

a towed ADCP and towed CTD system. This cooperative arrangement is envisioned to continue in FY95, as the Coast Guard is interested in the results of the research.

In addition to directly measured oceanographic and atmospheric variables, SEA physical oceanography will use prepared data products. In particular these will include satellite imagery (e.g. AVHRR, CZCS, and possibly SAR) when available, as well as large scale atmospheric pressure and downwelling index data for the North Pacific (available from Fleet Numerical Oceanographic Center, Monterey, CA). These data have been utilized in initial analyses of relationships between zooplankton and atmospheric/oceanic forcing. Large scale North Pacific sea surface temperature fields (available from Scripps Institution of Oceanography, La Jolla, CA) have been obtained on a periodic basis for updates and computations of anomalies over large regions of the North Pacific that have been identified in empirical orthogonal function analyses.

Fine Scale Physical Oceanography

Measurements of mesoscale and fine scale oceanographic features are essential for the thorough characterization of environmental conditions that constrain the growth and survival of the species being studied (pink salmon, their predators and their prey) in the western Sound during the 1995 SEA program. Closely spaced CTD measurements will be made in conjunction with ADCP sampling to elucidate the fine scale physical structure (e.g. thermocline, pycnocline, fronts, eddies, shear zones) within the western regions of the Sound, particularly in relation to the distributions of phytoplankton, zooplankton, juvenile salmon and salmon predators such as juvenile pollock and cod. These measurements will address physical conditions that characterize diel vertical migrations of these species. Two Seabird Seacat CTDs will be used in the characterization of fine scale structures. These instruments are highly portable and self contained and will be transferred back and forth between the larger seiners for offshore and nearshore work and the small skiffs for inshore measurements. The ADCP will principally be used for characterizing the large scale velocity field in western PWS, but will occasionally be deployed aboard the seiner or a small skiff for nearshore work, particularly in relation to characterization of velocity fields related to small scale frontal structures and nearshore tidal rips.

Integration of Large and Small Scale Physical Oceanography

The migratory pathway that the salmon utilize during their outmigration from the Sound will be characterized in terms of its physical (and biological) oceanographic structure. The problem of whether these animals utilize specific physical conditions and oceanographic structures during their outmigration will be addressed. This will be accomplished through the integration of large and small scale horizontal and vertical measurements made in western PWS. The sampling frequency will be highest during the months of April through June, with less frequent sampling in July and August. Horizontal spatial sampling scales will range from meters to kilometers and vertical scales will range from meters to hundreds of meters.

Large and small scale physical, chemical and biological data will also be assimilated into numerical models of the deep and surface circulation in the GOA and PWS. The modeling efforts are described under a separate project (Information Systems and Modeling).

Fall and Winter Oceanographic Measurement Programs
Winter surveys of both large and small scale physical properties and structures within the PWS/GOA region will be conducted in order to fit observed environmental conditions within the context of the very substantial annual and interannual variability that governs the meteorology and oceanography of the North Pacific. In particular the physical transitions from El Niño to La Niña conditions will be documented in order to assess and predict changes in the structure and distribution of animal and phytoplankton assemblages in response to these environmental regime shifts. The nature and phasing of large scale long term temperature changes in PWS in relation to the (18.6 year) nodal tide will also be addressed.

PROJECT IMPLEMENTATION

This PWS Science Center will be the lead organization in the implementation of this project. Oceanographic sampling will take place principally on vessels chartered by ADFG. The U. S. Coast Guard has also agreed to provide vessel time for SEA oceanographic sampling during 1994. Opportunities for continued sampling aboard Coast Guard vessels during FY95 are being sought out at this time.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The SEA physical oceanography program will be closely coordinated with other components of the SEA field and modeling studies. All of the physical oceanographic field surveys will be conducted in conjunction with a combination of chemical oceanographic and phytoplankton sampling, zooplankton assessment and capture, and nekton (both juvenile and adult fish) assessment and capture. Also, by arrangement between the Alaska Department of Fish and Game and the National Biological Survey, marine mammal and bird observers will be onboard some of the sampling vessels in coordination with projects 94102 (murrelet prey), 94159 (marine bird surveys) and 94173 (pigeon guillemot). The SEA program will be integrated with project 94163 (forage fish study) whenever possible and appropriate. The SEA program will be coordinated with ADFG projects that relate to pink salmon and herring but were underway before the initiation of SEA planning efforts. These include projects 94166 (herring spawn deposition survey), 94184, 94185 (coded wire tagging studies), 94187 (otolith marking), and 94191 (oil related egg and alevin mortalities). In addition, USFWS and NMFS personnel have been contacted to coordinate efforts undertaken in the NOAA forage fish study in PWS. In summary, we will work with all personnel who have an interest in the oceanography of the region for use in their research, and to strengthen the interdisciplinary nature of the research proposed to be continued from the FY94 field season.

A cooperative investigation involving the chemistry of mussel tissue, seawater and sediments has been initiated during FFY94 by the Auke Bay Laboratory (NOAA) and the PWS Science Center. The investigation stems from NOAAs ongoing mussel watch program, but has been endorsed by the SEA program because the results of the mussel sampling program are pertinent to the hypotheses generated for the initial phase of SEA. It is envisioned that the

mussel collection and interpretation can be broadened as part of the SEA field studies. SEA investigators could provide support for data collection within the Sound during periods when field sampling is underway. SEA investigators collected samples for Auke Bay during FY94.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	560.4
Commodities	0.0
Equipment	0.0
Subtotal	563.4
Gen. Admin.	14.4
Total	577.8

Sound Ecosystem Assessment (SEA), An Ecosystem Research Plan for Prince William Sound -- Nearshore Fish (SEA-FISH)

Project Number:	95320N
Restoration Category:	Research (continuation of 94320N)
Proposed By:	Prince William Sound Science Center
Lead Trustee Agency:	ADFG
Cost FY 95:	$635,200
Cost FY 96:	$635,200
Total Cost:	Unknown
Duration:	Unknown
Geographic Area:	Prince William Sound and north Gulf of Alaska
Injured Resource/Service:	Pink salmon and Pacific herring

INTRODUCTION

Accurate prediction of abundance is a prerequisite to efficient restoration, rehabilitation or compensation of anthropogenic damages, such as oil spill damage, to key animal populations. For example, fisheries science has used hatchery practices on a widespread basis to restore, rehabilitate, and compensate for overfishing, habitat destruction and industrial damages with little knowledge of ecosystem impacts. Recently, hatchery practices have been critically reviewed and their benefits have become highly controversial. Similar controversies exist over shoreline oil cleanup practices, habitat modification programs, and animal rehabilitation and recovery centers. Restoration practices will remain controversial until our understanding of ecosystem level processes allow for the development of predictive models. Predictive models are the tool for determining the outcome of anthropogenic events (oil spills, habitat loss, etc.) and restoration of damages.

The first step in developing tools for the prediction of population structure and change in Prince William Sound is to develop a better understanding of the marine ecosystem. Unfortunately, the dynamics of marine ecosystems is poorly understood making accurate predictions of change in marine animal populations impossible. The dynamics in composition and production of the plankton/nekton assemblage that resides in PWS is no exception, despite the intensive single population assessments after the *Exxon Valdez* oil spill. For instance, there are some long term databases on the harvests of key commercial fish populations, yet little is

known about how fluctuations of co-occurring populations (prey and predators) affect the abundance of the key populations, or how change in prey and predators populations are affected by climate-driven warming and cooling processes.

In response to the lack of ecosystem and species-specific knowledge, SEA advanced several ecosystem level hypotheses to explain the physical and biological dynamics of PWS and potential impact on previously identified sensitive populations, pink salmon and herring. The hypotheses emphasize the potential role of climate driven circulation patterns on the abundance and distribution of macrozooplankton food of juvenile fish (the lake river hypothesis), how changes in water circulation patterns may effect predator and prey dynamics (prey switching hypothesis) and the role of winter rearing habitat on the survival of juvenile herring (overwintering hypothesis). Evidence exists suggesting that climate driven events are important for understanding survival of many fish populations.

Pearcy has shown a positive correlation exists between the intensity and frequency of upwelling events (climate-driven oceanographic and atmospheric processes) and salmon survival along the Oregon and Washington coast. Cooney has shown that the critical food sources for larval and juvenile fishes in PWS, the large oceanic calanoids, undergo annual and seasonal fluctuations in abundance, and proposed that climate-driven ocean currents cause major fluctuations in the calanoid abundance. Recently, low survival of salmon and herring has been attributed to shifts in predator populations into the La Perouse Bank during El Nino years. Furthermore, the lunar nodal hypothesis suggests an 18.6 year cycle in climate driven warming and cooling of the eastern North Pacific) that may affect prey and predator populations, which influence fish production. Thus, it is likely that climate driven fluctuations in ocean processes influences prey and predator abundance and distribution of salmon and herring survival in PWS.

The scientific goals of the Sound Ecosystem Assessment Plan (SEA) are to:

1. Improve our understanding of the ecosystem level processes that determine the abundance and interaction of key animal populations in Prince William Sound (PWS), focusing initially on pink salmon and Pacific herring, their predators and prey, and how they respond to climate driven physical processes.

2. Develop and apply new measurement technologies for accurately and synchronously assessing ecosystem variables (temperature, currents, prey, predators. etc.) that affect the survival of the key animal and co-occurring populations of prey and predators.

3. Incorporate the new and improved information into numerical models to predict the abundance of key animal populations.

4. Using new predictive capability, determine best protocols to restore, rehabilitate or compensate for anthropogenic damages to key animal populations.

Knowledge of the effects of toxic chemicals, such as hydrocarbons from an oil spill; on individual organisms is extremely useful to characterize the qualitative nature of impact that

occurs with the introduction of a toxicant into the environment. However, to determine the quantitative impacts, understanding of ecosystem-level interactions is essential. Westman presented four approaches that are used to study ecosystem level impact. They are listed here by the strength of the scientific method and logistic difficulty: (1) in situ, experimental manipulations of the natural ecosystem, (2) in situ, synecological studies of natural ecosystems along disturbance gradients, (3) in vivo, microcosm studies, and (4) in vitro, data assimilation into computer models of natural ecosystems, which can be subjected to disturbance by simulations.

The SEA program is offered a unique opportunity to take an ecosystem manipulation approach because of the operations of the PWS hatcheries, which release over 700 million salmon fry annually. For example, pilot field studies of predator response to hatchery releases were conducted using underwater acoustics at the Sawmill Bay, Esther and Cannery Creek facilities in 1992 and 1993. A major survey of the outmigration corridor for pink salmon is ongoing in the western Prince William Sound. Thus, the initial implementation of the SEA program is using hatchery releases as the experimental manipulation of the trophic structure supporting pink salmon survival. Synecological studies and simulation models of the ecosystem along natural and gradients via poststratification of field measurement data will be possible for pink salmon and Pacific herring.

SEA's conceptual framework is similar to GLOBEC, a National Science Foundation sponsored program titled Global Ocean Ecosystems Dynamics. The PWS pink salmon and herring populations fluctuate in abundance as the cumulative result of three processes: birth, mortality and transport. A simplified description of the population growth rate is:

$$dN/dt = Birth\ rate - Death - Immigration + Emigration$$

where,

- *Birth* is influenced by the numbers and condition of the parents and the environment at spawning,
- *Death* is influenced by the condition of the eggs or fish and the environment, which is primarily a function of growth and predator densities,
- growth is influenced by the abundance, distribution and quality of prey, ambient physical conditions, maintenance and activity levels, interactions with predators and competitors, and condition of the fish, and is often expressed as consumption - (Respiration + Waste Losses), which are functions of food quantity and quality, competition, and condition of the fish and environment.
- *Immigration* is the transport (as a behavioral or physical advection process) or straying (behavioral or random diffusion) of fish into the population, which is primarily a function of the physical environment and the behavior of the fish,
- *Emigration* is the transport or straying of fish out of the population.

The importance of ocean ecosystem state and the condition of the fish (population state) is emphasized since physical and physiology/behavior conditions affect each variable and their subvariables in time and space. The importance of biological ecosystem state is emphasized

fewer times above, but can dominate *dN/dt*. SEA's large scale surveys with nested fine scale examination of mechanistic processes using quasicontinuous measurement technologies are essential to reliably describe physical and biological state.

To understand anthropogenic or natural effects on the production of pink salmon and herring, SEA developed several hypotheses. The primary hypotheses of the SEA program concerns flushing of prey from the Sound (the river-lake hypothesis) and the switching by predators to larval fish when the macrozooplanktors are not abundant (the prey switching hypothesis). These are coupled hypotheses because when the flushing of PWS is high, the macrozooplankton prey is low, which causes larval and juvenile fish predation to be high. Since flushing is positively correlated with storms, and stormy years are cold years, the physical growth conditions (temperature and currents) are also poor when there is limited prey. Preliminary results this year suggest that prey switching is a seasonal event, and that the duration and intensity of this phenomenon is an object to quantify with respect to river or lake years.

Many researchers have proposed that multiannual, climate-driven cycles of three, five, seven, 14, 18.6 years have a dominant influence on marine productivity and fish recruitment. Shifts in predator populations as a response to climatic events have also been shown to have pronounced impacts on key marine fish populations. Preliminary results this year suggest that walleye pollock is a primary predator on juvenile fishes in the Sound. The influence of climate changes, such as those induced by EL Nino and La Nina events, on the walleye pollock distribution needs to be examined with respect to river or lake years.

Given the likelihood that natural, climate-driven cycles have a dominant influence on marine fish recruitment, the description of these phenomenon are logical steps in the future testing of the river-lake and prey-switching hypotheses which is the prerequisite to evaluation of anthropogenic influences such as oil spills, hatchery practices, commercial fishing, and the restoration of damage.

Using the North Atlantic program as a guide, SEA will be implemented by three interdisciplinary efforts: (1) large and fine scale, field studies on physical oceanography and plankton/nekton ecology, (2) applications and development of new technologies, and (3) mathematical modeling. The application of acoustic and optical technologies in the large and fine scale field studies, physical oceanography and the mathematical modeling are included in proposals submitted by the PWS Science Center.

To solve the sampling problems of scale and time, SEA projects have restricted their field sampling efforts to the timing and route of the outmigrating juvenile pink salmon and the nearshore rearing areas of Pacific herring. In agreement with GLOBEC, SEAOCEAN and SEAFISH incorporate optical and acoustic technologies that provide quasicontinuous data necessary for describing spatial and temporal characteristics of physical and biological patchiness along migratory routes. Acoustic and optical targets will be subsampled with a variety of nets and other seatruthing capabilities to collect biological information. The seatruthing is a principal task of other cooperating SEA projects supervised by ADFG and UAFIMS and is the primary activity where commercial fishermen will contribute their expertise

to the scientific investigation.

Large scale sampling will define potential prey and predator concentrations (distributions) along the offshore route of the pink salmon outmigration and in the juvenile Pacific herring rearing areas. This information will be collected simultaneously with the physical and biological oceanography to evaluate specific climate-driven hypotheses. The fine scale sampling will define the population and individual-level interactions between predators and prey and how these interactions may be influenced by dominant physical processes, such as tidal fluctuation.

Implementation of the SEA plan is via a team effort between physicists, biologists, computer scientists, communication specialists, fishermen, government and private organizations. The team approach serves several purposes. First, a diverse team is essential because of the wide variety of technical expertise needed to acquire and analyses ecosystem data (physical, biological, technologists, etc.). Second, a team approach that integrates the public, the government and private organizations into the planning process is essential to develop a unifying ecosystem plan. Protection of valuable renewable resources within an ecosystem requires a unifying plan to establish goals that are developed by, and therefore acceptable to, the public. Despite huge government investments, regulatory agency mandates and goals programming efforts have failed to meet the public's expectations of sustaining valuable renewable resources that support local economies and quality of life.

A unifying ecosystem plan that integrates agency, private and public concerns into publicly accepted goals can be used for several purposes. Although the SEA plan is not a complete ecosystem plan it has allowed us to prioritize research and monitoring data collection efforts for the purposes of developing better predictive capability. As pointed out earlier, this is a prerequisite for establishing non-controversial restoration plans. In the same sense, the expansion of the plan to a complete ecosystem level will allow for regulatory agencies to prioritize what needs to be done and better define cooperative roles in ecosystem management. Allowing public and private roles in the ecosystem planning efforts will create a partnership between government agencies, academic scientists, the public and the private user groups that is necessary for establishing sustainable use practices for renewable natural resources.

NEED FOR THE PROJECT

The fundamental research needed to develop an improved understanding of the ecosystem level processes in Prince William Sound is defined in SEA as the development of integrated physical and biological state models. Paramount to the physical state model is the description of a climate-driven, tidal/temperature-influenced, current model of the Sound. This model is being developed by the SEAOCEAN project. Paramount to the biological state model is a description model of a plankton-nekton density distribution model for the Sound and how it relates to the physical state model to determine climate-driven biological response. This descriptive model is being developed by SEAFISH project in collaboration with the pink salmon and herring capture projects (ADFG), and the zooplankton capture projects (UAFIMS) who provide the biological data on acoustic target distributions. The integration of the acoustic and

biological data will allow interpreting biological response of the assemblage to climate driven processes by key and co-occurring populations. The integration of the physical and biological state models are necessary to test river lake and prey switching hypotheses. These descriptive models are being converted into numerical predictive models by the SEADATA project, focusing primarily on improving the predictions of two selected species, pink salmon and herring. By virtue of its quantitative nature, the SEADATA project is responsible for making improvements to measurement technologies for improving data quantity and quality.

PROJECT DESIGN

A. Objectives

SEAFISH will provide large and fine scale information on the abundance and distribution of macrozooplankton and nekton (pink salmon fry, juvenile herring, potential predators, potential competitors) to the SEA model. New information emerging from SEAFISH will contribute to a comprehensive data base for the fisheries of Prince William Sound. This information will serve the needs of the region for more informed management, enhancement, and mandated restoration activities. As a project within the multidisciplinary, integrated SEA program, SEAFISH will achieve the following objectives:

1. Acoustically describe the macrozooplankton density and distribution with high frequency sonars (HFS) and an optical plankton counter (OPC).

2. Combine acoustic, plankton net catch and oceanographic data to evaluate the river-lake and prey switching hypotheses.

3. Develop protocols for directing net sampling by UAFIMS researchers.

4. Acoustically describe the nekton density and distribution with digital multibeam beam sonars (DMBS).

5. Combine acoustic, nekton catch and oceanographic data to evaluate the prey switching hypothesis.

6. Develop protocols for directing net sampling by ADFG researchers.

7. In collaboration with other EVOS researchers, integrate the SEAFISH research project with research on sea birds, mammals, other fishes, terrestrial ecology and ecotoxicology.

B. Methods

The following methods will be used to address the specific objectives.

Objective 1 - macrozooplankton

The large scale density and distribution on density of the macrozooplankton will be measured using a three-frequency, digital, scientific echosounders (HFS) and an optical plankton counter (OPC). The frequencies chosen are 420, 720 and 1000 kHz. All transducers will be of dual or split beam configurations to obtain both integration of acoustic backscatter and determine target strengths. These frequencies will be supplemented with either 70 or 120 Khz digital split beam sonars (DMBS) to collect synchronous measures of nekton targets. Initially, the HFS will be deployed on a towfin and the OPC on an aquashuttle. The feasibility of deploying the HFS on the aquashuttle is being investigated. The aquashuttle deployment allows for yoyo towing, or high resolution measurement of the upper water column. The DMBS and HFS system will be deployed from the trawler and work the large scale western Sound transects.

The initial processing of DMBS, HFS and OPC data will occur in real time using BIOMAP software on a DOS platform aboard the sampling vessel. Post-processing, analysis, and visualization of the data will occur in the laboratory on UNIX workstations using software developed in house using Interactive Data Language (IDL), Advanced Visual Systems (AVS) and ARCINFO.

Objective 2 - nekton

Large scale measurements of fish distributions will be made using 70 and 120 Khz digital split beam sonars. Initially, the program will use a 120 kHz dual beam, and shift to 70 kHz digital dual/split beam systems as they become available. Transducers will be mounted on a stable platform and towed along the side of survey vessels at speeds of about 6 knots. Sampling will occur in western PWS between April and August and through the entire Sound all year for herring. As above, the preprocessing of data will occur in real time on a DOS platform. Post-processing, data analysis and visualization will occur in the laboratory using software developed from IDL, AVS and ARCINFO. The feasibility of using high resolution video, panchromatic, compact airborne, spectrographic, imager and or other aerial optical techniques to map nearshore concentrations of fishes and to use such information to stratify fine scale survey efforts for nearshore herring assessment will be investigated.

Objective 3 - birds, mammals, other fish

SEAFISH will collaborate with other EVOS researchers and integrate with research on sea birds, mammals, and other fishes. The large scale distribution and information on density of the macrozooplankton and fishes, and oceanographic data (current velocities and temperature), will provide valuable information to bird and mammal researchers. Bird and mammal observers will use visual, photographic, and video measurement techniques on the western Sound vessel and aerial transects.

Synoptic sampling of both the biological and physical characteristics of the water column and samplers that operate on quasi-continuous, spatial and temporal scales are essential if SEA is to link small scale process measurements to population and ecosystem parameters. In response to this, the three core SEA projects, SEAOCEAN, SEAFISH and SEADATA incorporate the necessary acoustical, optical, measurement and computer intensive analytical and communication tools. Recognizing the rapid evolution of technologies, a small component of each SEA project will be the research and development of new hardware and software.

C. Schedule

The SEA field program will use the conceptual experimental design of GLOBEC, which involves the nesting of fine scale measurement programs within large scale ecosystem monitoring efforts. Ocean state and macrozooplankton prey monitoring will require large scale surveys in the: (1) eastern Sound, (2) western Sound, and (3) coastal buoyancy current, and fine scale studies in the: (4) Hinchinbrook Entrance, and (5) Montague Straits. Monitoring will require large scale and fine scale surveys in the western Sound, which is the primary migration route of pink salmon and Pacific herring.

Western Sound and Montague Straits surveys will be the primary survey areas for the 1994-95 field seasons. Surveys in these areas will commence in April and run through July during the pink salmon outmigration. As Pacific herring spawning and rearing surveys are initiated, additional study areas in the eastern Sound, coastal buoyancy current and Hinchinbrook Entrance may be added. These surveys will be conducted between the September onshore migration of adult herring into the Sound and the spring spawning season.

D. Technical Support

SEAFISH is a multidisciplinary study that will rely on: (1) cooperative, model development to assist in sampling design, data analysis and interpretation, (2) shared vessel and facilities for data collection and logistical support, (3) data sharing with the agency and university principal investigators, and (3) remote sensing with acoustical and optical technologies. The cooperative model development will be closest between Dr. Salmon (SEAOCEAN) and Dr. Patrick (SEADATA). Interaction between SEAFISH and SEAOCEAN will be to develop the descriptive model of biological response to physical forcing functions (current velocity and direction). The descriptive model will serve as a guide for the development of numerical models under the SEADATA project that allow for prediction.

The majority of acoustic data that are collected will be on ADFG fishing vessel charters while working synchronously with net sampling of nekton (ADFG) and plankton (UAFIMS). Data sharing with these cooperative projects are essential in interpreting biological response to physical forcing phenomenon by key or co-occurring populations. Dr. Cooney (UAFIMS) is the primary technical support for acquiring macrozooplankton biological information and Mark Willette, Evelyn Brown/Bigg and John Wilcox (ADFG) for nekton biological information. SEAFISH will rely heavily on the existing knowledge and skills of commercial fishers for the capture fishes that are observed acoustically. Prince William Sound Aquaculture salmon

hatcheries in the region will provide logistic support for SEAFISH field crews (communications, gas, supplies, etc.) and the hatchery releases of pink salmon will be treated as experimental manipulation of the nearshore Sound ecosystem.

E. Location

This project will be conducted in Prince William Sound and the adjacent waters of the North Gulf of Alaska.

PROJECT IMPLEMENTATION

The SEAFISH project is funded by a subcontract to the Prince William Sound Science Center from the University of Alaska, Institute of Marine Sciences in accordance to a research service agreement (RSA) with the Alaska Department of Fish and Game. As a Trustee Council agency, the Alaska Department of Fish and Game receives funding from the U.S. District court when approval is issued by the Council to fund this project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The SEAFISH project is a coordinated ecosystem research effort between state and federal agencies, universities, private corporations, Alaska Natives and the public. The coordination and communication between cooperating parties will be facilitated by wide and local area networks using SHOWMe software.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	616.4
Commodities	0.0
Equipment	0.0
Subtotal	619.4
Gen. Admin.	15.8
Total	635.2

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Sound Ecosystem Assessment (SEA), An Ecosystem Research Plan for Prince William Sound--Avian Predation on Herring Spawn

Project Number:	95320Q
Restoration Category:	Research (continuation of 94320Q)
Proposed By:	USFS
Lead Trustee Agency:	ADFG
Cooperating Agencies:	DOI, NOAA
Cost FY 95:	$99,000 (includes $23,100 for data analysis and report writing of FY 94 work)
Cost FY 96:	$30,600
Total Cost:	$129,600
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring

INTRODUCTION

Pacific herring (*Clupea pallasi*) has been identified as a resource injured by the *Exxon Valdez* oil spill. Studies conducted from 1989-1994 have documented a significant decline of spawning biomass. In 1993 and 1994, the total observed spawning populations were less than one-third and two-thirds of pre-season prediction, with the 1994 commercial herring fisheries season totally cancelled.

The SEA Plan hypothesizes that the recruitment success of herring populations in Prince William Sound (PWS) is related to losses due to physical processes (e.g. wave action and currents) and to predation during the embryo and larval stages. This study is a continuation of research begun in FY94 by the U.S. Forest Service aimed at determining herring egg loss to avian predators. In spring 1994, avian predation on herring spawn was intensively studied on northern Montague Island. A preliminary analysis of the 1994 data is underway and initial results will be available for presentation at a Fall 1994 program review.

Understanding the factors affecting herring egg loss is necessary to accurately model herring recruitment for fisheries management. Currently Alaska Department of Fish and Game (ADFG) estimates the adult spawner biomass from total egg deposition, average fish size and sex ratio, and average fecundity at size measured. Losses to predation and physical processes before and after ADFG spawn deposition surveys are needed to accurately calculate spawning biomass and to assess the impact on recruitment to the larval stage.

Throughout incubation, egg loss can be significant. During a 2-year study in 1990 and 1991 in PWS, rates of egg loss as high as 91.2% have been measured, with an overall estimated egg loss rate of 50.4% throughout the incubation period. Predators of herring spawn include invertebrates, marine mammals, fish, and birds. Epibenthic invertebrates (crabs, snails, and starfish) and birds--primarily Glaucous-winged gulls (*Larus glaucescens*), herring gulls (*Larus argentatus*), and surf scoters (*Melanitta perspicillata*)--have been identified as the greatest sources of egg loss on spawning areas in Washington and British Columbia. Until this study began in spring 1994, only potential sources of predation were identified in PWS.

Prince William Sound has a large resident population of herring spawn avian predators including glaucous-winged gulls and surf scoters. Surf scoters are abundant in the region and the most numerous sea duck. Migrant surf scoters are numerous in April and May. Glaucous-winged gulls are also an abundant resident. Although they are present in numbers throughout the year, an influx does occur in spring, mainly between mid-april and mid-May. Historically, large numbers of glaucous-winged gulls (30-50,000) have been observed in areas with herring spawn at northern Montague Island.

Northern Montague Island is also an important spring migratory stopover for two species of shorebirds that prey on herring spawn: surfbirds (*Aphriza virgata*) and black turnstones (*Arenaria melanocephala*). In May 1992 a single day count of almost 56,000 surfbirds and 25,000 black turnstones was recorded.

Spatially and/or temporally, herring spawn deposition in PWS coincides with breeding for a large resident population of glaucous-winged gulls, and with spring stopover areas for seaducks and shorebirds. Until this study began, however, we had no information on numbers and distribution, and how predictable or variable the use of herring spawn is by resident and migrant birds. Nor has the importance of herring spawn in providing a super-abundant food resource for egg laying and migration been determined. From a fisheries management standpoint information on avian predation is important because if the avian predator population remains relatively constant or increases, the lower herring stock levels that PWS is currently experiencing could experience higher rates of predation.

NEED FOR THE PROJECT

As an injured species, Pacific herring is currently not recovering. The herring fishery is crucial to the economy and well-being of PWS communities. SEA Project No. 95320Q will continue to investigate the effects of avian predation on herring spawn survival. As part of the SEA plan, it is designed to complement ADFG's Project No. 95166, an ongoing long-term study on herring natal habitats. The goal of Project No. 95166 is to improve herring fisheries management in PWS by determining accurate and precise estimates of herring abundance. A better understanding of the loss of herring spawn to avian predators will improve estimates of egg loss used in current stock assessment models. These models are used by fishery managers to set herring harvest quotas. As part of the SEA Plan, this project will also provide further information on the regulating effect that bird predation has on recruitment into the herring population.

PROJECT DESCRIPTION

A. Objectives

The goal of this project is to assess and document the impact of avian predation on herring spawn in Prince William Sound. Results will be integrated into a model relating Sound-wide herring embryo survival to predation, habitat type, egg density, and meteorological conditions. Specific hypotheses that will be tested include:

1. Distribution, timing, and abundance of gulls, seaducks and shorebirds is positively correlated with dispersion, timing, and abundance of herring spawn.

2. Avian predation on herring spawn is a function of egg density.

3, Egg loss resulting from avian predation occurs at higher rates in years when eggs are scarce.

4. Herring spawn is a major component in the diet of bird species foraging in herring spawn areas.

5. Viable herring spawn are preferred prey compared to dead and decaying spawn.

B. Methods

The impact of avian predation on herring spawn will be documented by observing the distribution, relative abundance and behavior of birds foraging in herring spawn areas and by analyzing their diets. Herring spawn deposition density and subsequent egg loss will be documented by the concurrent ADFG Project No. 95166. The extent and distribution of herring spawn will be documented from daily aerial flights conducted as a regular part of ADFG commercial fisheries management.

The phenology, relative abundance and species composition of birds foraging in herring spawn areas will be documented using boat and aerial shoreline surveys. Avian near-shore boat surveys will be conducted at low tide along a 15-km length of shoreline containing herring spawn. Transects will include an equal amount of shoreline with and without spawn. Transect width will extend from the shoreline seaward to 120m. Data collected will include: location, number and species (or genus), shoreline type, activity, and habitat (land, water, or air).

Aerial surveys will cover nearshore areas at northern Montague Island from just south of Port Chalmers to Zaikof Bay (approximately 100km of shoreline). Surveys will be flown during low tide, at an altitude of 250-360m. A hi-band video camcorder mounted in the bulkhead of a fixed wing aircraft will be used to record numbers and distribution of gulls and scoters. VHS output will be georeferenced with the aircraft's Global Positioning System (GPS). To identify and count birds in the lab, Super-VHS images will be analyzed using image analysis software.

Foraging ecology in herring spawn areas will be determined from: scan and focal animal samples, prey availability and removal, and diet analysis. Randomly located plots including both intertidal and subtidal zones will be scanned for birds every 30 minutes over a tidal cycle. For each species, information recorded will include activity, location, and habitat (substrate and meters above or below the tideline). To document activity budgets of avian predators, a series of 10 minute focal-animal samples will be collected.

Prey availability in the intertidal zone will be determined using random transects within the boat survey area. Transect locations will be stratified between spawn and no spawn areas. Quadrats ($0.01m^2$) will be used to sample prey items at intervals along the transect. All prey items within the plot will be quantified. Availability of prey items suspended in the water $<1m$ below the tideline will be sampled with mesh frames.

Egg loss to avian predators will be determined using $1\text{-}m^2$ plots containing a known egg density. Using photography, initial egg density and subsequent removal will be determined for each plot. During a 3 to 6-hr observation period, bird activity within the plot will be recorded. Bird diets will be documented by collecting esophagus and proventriculus contents from 30 glaucous-winged gulls and 30 surf scoters. Sampling effort will be proportional to the spatial distribution of each species across the intensive study area.

C. Schedule

Oct 94	Formal review of FY94 season
Nov 94	Preliminary tests of new experimental protocol
Jan 95	Logistical planning; order equipment and supplies
Feb 95	Personnel selection
Mar 95	Begin field season
Jun-Aug 95	Field season completed, data entry and data analysis, submit 96 work plan
Sep-Nov 95	Data analysis, draft report writing and internal review
Oct 95	Formal review of the FY95 season
Mar 96	Peer review of 95 report completed, final report submitted

D. Technical Support

Herring egg densities and egg loss samples from ADFG diver surveys will be processed by ADFG. Aerial surveys on extent of herring spawn will be conducted by ADFG. Results from both of these efforts will be made available to this study for further analysis. Laboratory processing of esophageal and proventricular contents as well as biometric support will be contracted. Data will be archived by project staff in accordance with standardized procedures set up for handling the SEA Plan database.

E. Location

Field research will be conducted in Prince William Sound at northern Montague Island from Port Chalmers to Zaikof Bay. High densities of herring spawn have occurred in this area nine of the last ten years. Northern Montague Island also hosts the highest numbers of migrant surfbirds and black turnstones from late April through May.

PROJECT IMPLEMENTATION

This ongoing project is being implemented by the Copper River Delta Institute, a research institute of the U.S. Forest Service. This project is part of the 95320 SEA program, a cooperative effort by Alaska Department of Fish and Game, PWS Science Center, U.S. Forest Service, University of Alaska Fairbanks, PWS Aquaculture, as well as National Biological Survey, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration. Ongoing Copper River Delta Institute spring shorebird migration studies on the Copper River Delta will provide additional information on the phenology and habitat use of surfbirds and black turnstones.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is organized and coordinated under three of SEA's major programs: Natal Habitat, Predator-Prey, and the Database and Modeling. All aspects of field work for this study are coordinated with the Alaska Department of Fish and Game Herring Natal Habitats Study 95166. ADFG will provide herring egg densities and egg loss results from ADFG diver surveys and information on the timing and extent of spawn documented from ADFG aerial spawn surveys.

All data from this study will be archived by the project staff in accordance with standardized procedures set up for handling the SEA Plan database. The field results from the avian predation study will be integrated into the SEA plan's numerical and analytical models of the PWS ecosystem that include predation parameters and animal distributions.

FY 95 BUDGET ($K)

Personnel	63.8
Travel	2.3
Contractual	14.3
Commodities	5.6
Equipment	2.5
Subtotal	88.5
Gen. Admin.	10.5
Total	99.0

Disease Impacts on Prince William Sound Herring Populations

Project Number:	95320S
Restoration Category:	Research (continuation of 94320S)
Proposed By:	ADFG
Cost FY 95:	$379,900
Cost FY 96:	$379,900
Total Cost:	Unknown
Duration:	2-3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring and commercial fishing

INTRODUCTION

Prior to the 1993 herring spawning season, 134,000 tons of herring were forecast to arrive on the spawning grounds of Prince William Sound. Significantly less than half that amount appeared. Skin lesions, typically ulcerated, were seen on one-sixth to almost one half the fish in almost every school (except northeastern PWS). Viral hemorrhagic septicemia (VHS) was isolated from these fish but it was not determined whether this virus was the cause of the poor returns and apparent disease or simply a secondary infection in fish which were already in poor health for another unknown reason. Nevertheless, the virus which causes VHS was the only pathogen isolated from these fish. In 1994, it appears that only 20,000 tons of herring have arrived at the spawning grounds, little spawning has occurred, many ovaries are degenerate and the lesions, never a reported feature of the spawning population prior to 1993, are also abundant this year. Though human induced large mortalities of fish commonly occur in many places, natural epizootics of this magnitude are very rare. Herring are very long lived fish (to 15 years) and, in the absence of catastrophic events, dramatic population declines should not be expected.

VHS is a very poorly understood disease. It has the potential to infect many, perhaps most, species of bony fishes (fish other than sharks and rays), but its ability to produce disease varies from species to species. Salmon may be carriers, for example, while rainbow trout in European hatcheries suffer severe mortalities. Attempts to produce the disease in cod with cultures isolated from other cod have met with mixed success.

In 1994, the Trustee Council sponsored investigation of herring disease in Prince William Sound. VHS was again isolated from spawning Prince William Sound herring, but it remains unknown whether this pathogen is a significant cause of the decline in the size of the PWS herring population. Diseased animals have been observed during spawning, but it is unknown whether this epizootic is in progress prior to spawning or continues after spawning. Though large interannual mortalities are apparent, it is unknown whether these are concentrated during any particular part of the year and what other factors besides VHS may be associated with them.

NEED FOR THE PROJECT

Prince William Sound Pacific herring (*Clupea pallasi*) support five commercial fisheries in PWS with an annual average ex-vessel value of $8.3 million. In addition, several thousand pounds of herring and herring spawn on kelp are harvested annually for subsistence purposes and form an important part of the local native culture of Chenega and Tatitlek. Pacific herring provide important forage for many species including some species severely injured by the *Exxon Valdez* oil spill. Predator species include humpbacked whales, seals, sea lions, gulls, sea ducks, shore birds, halibut, salmon, rockfish and other fish. Significant declines in marine birds and mammals which eat forage fish have been reported from Prince William Sound. Decline in the prey base, of which herring constitute a major portion, has been implicated in decline in bird and mammal numbers. Thus a major reduction in herring numbers in Prince William Sound has the potential for significant impacts throughout the ecosystem. It is incumbent upon the Trustee Council to investigate circumstances which could seriously limit the recovery of species injured by the *Exxon Valdez* oil spill. Collapse of the herring population has that potential.

PROJECT DESIGN

The design for this project is yet to be determined because requests for proposals are being solicited through the State of Alaska Multi-Step procurement process. Nevertheless, some general statements may be made at this time.

A. Objectives

Determine the epizootiology of disease-associated decline in the size of the Prince William Sound Pacific herring population including microbial, anthropogenic and environmental causes.

B. Methods

To be determined by successful bidder.

C. Schedule

To be determined by successful bidder.

D. Technical Support

To be determined by successful bidder.

E. Location

Prince William Sound

PROJECT IMPLEMENTATION

This project is to be implemented through the State of Alaska Multi-Step Procurement Process. Some logistics and pathogen diagnostic testing may be provided by the Alaska Department of Fish and Game if this is determined to be necessary for the successful completion of this project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This subproject was added to 94320 (Prince William Sound System Investigations) in 1994 and is expected to be part of this project in 1995. This subproject is closely allied with many of the other subprojects of 94320, with Project 94166 (Herring Spawn Deposition and Reproductive Impairment), and with Project 94163 (Forage Fish Influence on Injured Species). If VHS is a primary pathogen, a catastrophic decline in herring abundance will occur despite other environmental parameters which might be favorable and which are being investigated by other 94320 subprojects. Conversely, VHS may also be a sign of environmental stress and merely a secondary invader. In that case it would be much less responsible for the decline in the herring population than possibly adverse environmental conditions. Demonstrating the cause of the population decline may ultimately require information from these other subprojects. The health of the herring population in Prince William Sound will impact those animals with which it competes and those resources which prey upon it. Integrated information from the herring health subproject and the spawn deposition and reproductive impairment project may be able to predict the course of recovery for Prince William Sound Herring.

FY 95 BUDGET ($K)

Personnel	9.0
Travel	0.0
Contractual	350.0
Commodities	0.0
Equipment	0.0
Subtotal	359.0
Gen. Admin.	20.9
Total	379.9

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Juvenile Herring Growth and Habitat Partitioning

Project Number:	95320T
Restoration Category:	Research (new)
Proposed By:	ADFG and University of Alaska Fairbanks
Lead Agency:	ADFG
Cost FY 95:	$340,300
Cost FY 96:	$584,500
Total Cost:	Unknown
Duration:	3-5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring and commercial fishing

INTRODUCTION

Prior to the *Exxon Valdez* oil spill, there had been no baseline studies conducted to document distribution or abundance of larval or juvenile forage fishes including herring in Prince William Sound (PWS). Because little was known about the early life history stages of herring in PWS, estimates of oil exposure and documented effects on specific processes such as growth and mortality was difficult. We documented injury to the embryos and newly hatched larvae in 1989 and the precipitous decline in the spawning population in 1993. However, the gap in our understanding of what happened to the exposed larval and juvenile herring between 1989 and 1993 resulted in an inability to link cause and effects. We could not entirely separate the effects of oil exposure from those due to changes in oceanographic conditions, zooplankton abundance or density dependent predation. As we now take an ecosystem approach to answering questions about herring, we can fill in this gap in our understanding of the early life history stages. Through Prince William Sound Systems Investigation, Sound Ecosystem Assessment (SEA), we will address predator/prey relationships, physical processes affecting natal habitat, environmental factors controlling juvenile growth, mortality, and ultimate recruitment as adults, the relationship between transport of larvae and surface and subsurface currents in the sound, and location and condition of juvenile and adult herring in the winter. The proposed study will address the broader issue of what is causing the demise of herring in PWS by investigating dynamics of juvenile herring.

An ecosystem approach is needed now because lack of such an approach immediately following the oil spill caused interpretation of larval abnormality indices and the cause of the herring disease to be questioned. In 1993 and 1994 the adult spawning biomass was greatly reduced over previous years and showed a high incidence of skin lesions and occurrence of VHS virus. It is well known that exposure to oil can weaken the immune system in fish. This population is composed largely of fish that were one year old during the spill, of which we knew very little. However, because historic information indicated that the area covered by the oil trajectory overlapped the distribution of juvenile herring to a large degree, we suggested that the potential for exposure through ingestion of oiled particles and prey was great. Although the 1989 year class contributes under 5% of the affected population, the overlap between the oil trajectory and the drifting larvae was over 80% in 1989 resulting in a great exposure risk and potential for succumbing to disease. Abnormalities in free-swimming larvae were documented, but without a baseline index of occurrence we could not estimate the oil induced perturbance. Whether or not this year class, once infected, could have exposed the rest of the adult population when it fully recruited as four-year-olds in 1993 is speculative.

Many researchers now feel that understanding the early life history stages is crucial to understanding the variability and cyclic behavior of herring recruitment. The factors affecting the abundance of recruits are believed to include changes in predator abundance, zooplankton biomass, and oceanic conditions. Recent studies have also pointed to the importance of available habitat providing spatial refuge from predators and a nearby food supply. In addition, predator abundance and food availability affect foraging behavior (evidence of optimal foraging) and density dependent mortality of juveniles. Survival of larvae is probably less deterministic of ultimate recruitment than survival of juveniles; however, some years advective processes probably do impact herring recruitment. Because larval and juvenile stages lack density dependent growth mechanisms, density dependent predation is probably more important. Through the findings of this study and related SEA programs, we hope to describe the relative importance of zooplankton or food abundance, oceanic conditions, habitat requirements, and density dependent predation in determining the large fluctuations in abundance observed. In future years, we will continue to document those variations induced by the *Exxon Valdez* oil spill by defining baseline levels of morphologic and cytogenetic abnormalities (which were believed to be elevated in 1989) occurring in PWS larvae. In future years, the development of the ocean state model will enable us to describe advective processes of larval herring, its relative importance in determining recruitment, and its importance in determining distribution of juvenile herring inside and outside of the Sound.

NEED FOR THE PROJECT

The target species of this study is Pacific herring, one of the species listed by the EVOS Trustee Council as damaged and not recovering. This species experienced poor recruitment in 1993, when the 1989 year class would have been expected to enter into the fishery a disease (VHS) plagued the returning adult population. The resulting population crash which continued into 1994 resulted in reduction of the herring fishery in 1993, closures of all fisheries in 1994, exacerbating the already depressed economic state of the region. In addition, the herring

population decline has countless effects on the ecosystem including oil spill injured apex predators. Understanding and monitoring the recovery of this important species will be crucial to understanding the restoration of the species that feed upon them.

PROJECT DESIGN

This three to five year study will address several core hypotheses of the SEA including: 1) oceanographic and meteorological effects on plankton dynamics and fish distribution, 2) predator/prey relationships, 3) herring condition and overwinter survival.

A. Objectives

The overall objective of this multi-year project is to understand interannual variability in successful year classes of herring in PWS. This can be accomplished by examining the fish in the context of their total environment including their general distribution, the meteorology and oceanography driving the system, and the biology of the lower trophic levels which act as food for small herring. During the first year, we will collect basic biological and baseline information needed to refine study design. During the second year and beyond, we will examine finer scale processes and habitat characteristics affecting juvenile herring growth and survival. The juvenile fish aspect of the ecosystem study will achieve the following objectives this year:

1. To determine the general distribution and habitat characteristics of juvenile herring in the nearshore and offshore waters of western and southwestern portions of PWS.

2. To identify bays that are utilized by juvenile and adult herring during summer rearing.

3. To subsample these bays, and determine the relative distributions of juvenile herring and co-existing species in both bays and passes in PWS.

4. To determine the diet composition and relative food abundance compared to the relative juvenile herring abundance sampled in both bays and passes.

5. To compare age composition and growth of herring (using length frequency and size-at-age analyses) between areas and between bays and passes.

6. To determine levels of predation and relationships between juvenile herring predation rates, juvenile herring abundance, and macro-zooplankton abundance observed in bays and passes.

7. To determine the temporal and spatial differences in oceanic conditions in rearing areas in both bays and passes.

8. To monitor the age composition, growth, condition factor, food availability, and predation rates on a subsample of overwintering juvenile herring populations in PWS.

Although larval collections of herring will be made in FY95 by the zooplankton project within SEA, sample processing, data analysis, and interpretation will be completed in FY96 pending funding.

B. Methods

We will be collecting information on juvenile herring from two main locations: 1) four to six passes, bay mouths and offshore waters of western and southwestern PWS and 2) inside 4-6 bays typically utilized by juvenile herring during the spring and summer stratified by eastern, western and southwestern PWS. In the passes, juveniles and their predators will be collected by trawl (offshore) and seines (nearshore) by the Juvenile Salmon and Herring Integration project of SEA Physical oceanography and zooplankton data are collected simultaneously by the Zooplankton in the Ecosystem and oceanography components of SEA that share the research platform. General distribution in the passes will be determined acoustically by the Nearshore Fish/Acoustics project of SEA. Signal processing and analysis of acoustic data collected in bays will be contracted. In the passes, sites will be visited every two weeks. In the bays, juveniles will be sampled using bait seines, shared with the salmon and forage fish projects, and physical data, zooplankton, and hydroacoustics will be collected from a smaller companion vessel. Sampling will be more intensive in bays with collection of at least three sets of continuous data through tidal cycles stratified by month and location. These data, together with information on the structure of the area (e.g. depth, distance offshore) will be used to classify the nursery habitat utilized by juvenile herring.

Objectives will be met through analyzing data collected by the various platforms. The Juvenile Salmon and Herring Integration study (95320E) will provide data to meet objectives 1 in full and 3, 4, 5, 6, and 7 in part. Data collected and processed by the integration study to be analyzed by this study include juvenile herring distribution, relative densities, diet composition (stomach contents already processed), co-existing species, length frequency, weight and age to satisfy objectives 1-7. The majority of the bay-caught juvenile herring sample processing and data analysis will be accomplished through reciprocal service agreements (RSA) with the University of Alaska, Fairbanks The acoustics project of SEA will provide some of the broad-scale distribution and relative abundance information needed to complete objective 1. The remainder of the data needed to satisfy objective 1 will come from the Physical Oceanography project of SEA as well as physical data collected by this study. This study will in turn provide samples to the bioenergetics of PWS herring and related species study which will provide information of somatic energy cycles, condition factors, sexual maturity and ovarian energy indices relative to the other indices of juvenile herring. Pending support from and coordination with the community transfer coordinator for the Trustee Council, we will work with the high schools in the region to develop a volunteer data collection scheme to sample winter aggregations of juvenile herring occurring near the municipalities.

Aggregations of juvenile herring in bays throughout PWS will be identified by ADFG overflights conducted by the regularly conducted salmon escapement surveys (general funds) and by our project. Aerial surveys will be conducted weekly over a six-week period. A high resolution 8 mm video camera, that is directly linked to a GPS and downloadable to GIS, may be used during aerial surveys to track aggregations. There will be a separate contract for GIS data processing. Potential sample locations, derived from the historic literature, include bays in eastern PWS (Port Fidalgo including Fish Bay and Irish Cove, Port Gravina including Beartrap Bay, Jack Bay off of Valdez Arm), western PWS (Pt. Chalmers, MacLeod Harbor, Hanning Bay on Montague Island; Snug Harbor and Herring Bay on Knight Island; Naked Island; Port San Juan on Evans Island; and McClure, Main, Eshamy, and Whale Bays) and the southwestern exit (Puget Bay).

A variety of statistical methods and fisheries models will be used to analyze the data. As in the integration study, multiple regression analysis will be used to examine the relationship between feeding rates (dependent variable), predator feeding rates (dependent), and macro-zooplankton abundance (independent variable) to assess density-dependent mortality due to predation in order to meet objective 6. Growth rates between sites and among years will be compared using an ANOVA. Because aging of daily growth rings in otoliths of juvenile herring is time consuming it will only be employed on a small subsample of herring collected using methods outlined by McGurk. For a larger percentage of herring juveniles, we will use a time sequence of length frequency histograms to reveal growth of the fish over the study period. Stomach contents analysis will be used to estimate the diet composition of juvenile herring, with prey identified to the lowest taxonomic level. An ANOVA will be conducted to test differences temporally and spatially. Using the zooplankton abundance data and growth rate analysis, a simple bioenergetics model will be applied to evaluate whether the growth of juvenile herring was likely limited by low prey density. Relative fish abundance data (CPUE) will be related to several parameters of physical conditions including habitat characteristics using linear discriminant function analysis. A stepwise multiple regression is used to further refine the relative importance of the factors.

C. Schedules

October 1994 - January 1995
Finalize detailed study plan, coordinate with all companion projects and investigators based on results of 1994 sampling.

January - March 1995
Stage for FY95 field season.

Mid-May - July 1995
Field work in Prince William Sound, begin sorting and identification of stomach contents analysis and other lab work.

August - September 1995
Preliminary analysis of data.

D. Technical Support

This project requires strong supporting projects from other SEA projects including Physical Oceanography (PWSSC), Nearshore Fish/Acoustics (PWSSC), Pink Salmon and Herring Integration (ADFG/UAF), and Bioenergetics of Herring and Related Species (UAF). The bulk of the data processing, analysis and report preparation will be conducted by staff at UAF.

E. Location

We will concentrate on the PWS herring population. Although there is evidence that adult herring utilize offshore feeding grounds on the continental shelf adjacent to their spring spawning area, the data available suggest that juveniles remain in nearshore areas to feed year around. Therefore, we will concentrate in the nearshore bays and passes within and immediately bordering Prince William Sound.

PROJECT IMPLEMENTATION

Alaska Department of Fish and Game will take the lead with the majority of the data processing and analysis conducted through RSA with the University of Alaska, Fairbanks with Brenda L. Norcross as the Co-Principal Investigator supervising all work. Dr. Norcross conducted a larval fish study in PWS in 1989, is a fisheries oceanographer, and is the logical choice for this position. Involving a new individual would involve additional costs in bringing them up to speed.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The proposed study is a new part of the integrated Prince William Sound Ecosystem Assessment (SEA) which was initiated in 1994. This project is designed as an interdisciplinary study which focuses on transport of herring larvae but is dependent upon results of the concurrent Salmon and Herring Integration Project, Physical Oceanography and Nearshore Fish/Acoustic projects through shared data and resources and integrated sampling plans. This study will use results generated by Zooplankton in the Ecosystem, Phytoplankton and Nutrients, Bio-energetics of Herring in PWS, and the VHS study which was initiated in April 1994 on an emergency basis. It will also be coordinated and conduct data-sharing with FY95 studies on forage fish, pelagic seabirds, and marine mammals. The information gained from this proposed study will contribute to the PWS herring recruitment model that is part of the Herring Natal Habitat study.

FY 95 BUDGET ($K)

Personnel	58.1
Travel	2.0
Contractual	248.8
Commodities	6.3
Equipment	0.0
Subtotal	317.9
Gen. Admin.	25.1
Total	340.3

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Somatic and Spawning Energetics of Herring and Pollock

Project Number:	95320U
Restoration Category:	Research (new)
Proposed By:	University of Alaska Fairbanks
Lead Agency:	ADFG
Cost FY 95:	$99,400
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Spill area
Injured Resource/Service:	Pacific herring

INTRODUCTION

This project will focus on the seasonal somatic energy cycles of two important forage species in the EVOS region: the Pacific herring and the walleye pollock. It will also explore over-winter survival of juvenile herring and herring reproductive biology. Historically, herring and pollock have been among the most abundant pelagic forage fishes in southcentral Alaska. After the *Exxon Valdez* oil spill the herring population of Prince William Sound has been exhibiting reduced abundance, disease, and spawning anomalies that may be related to pollution. This research effort will focus on energetics and spawning biology of herring from Prince William Sound.

Based on larval surveys, pollock are known to be abundant in the EVOS region. Little is known about *in situ* pollock energetics but, like herring, they are heavily preyed upon by commercially important fish species, sea birds and harbor seals. This project will provide the energetic information necessary to quantify trophic interactions involving pollock.

Forage fishes are key components of the pelagic food web. They are both predators and prey and their energy cycles reflect the overall production process. This energetic work will provide the basic information needed to quantify trophic interactions for two of the most common forage species in the EVOS region. A long term monitoring program of energy flow in both herring (*Clupea harrengus pallasi*) and pollock (*Theragra chalcogramma*) may also provide some insight into how these two key forage species interact. The study of herring reproductive biology

will be useful in managing the roe fishery.

Typically high latitude fishes store energy during summer and fall feeding and throughout the winter reallocate energy to reproduction. Thus, seasonal tissue samples must be taken to account for the temporal variation in energy content.

NEED FOR THE PROJECT

The invitation to submit restoration projects identifies food web studies as having a high priority. Basic to all food web studies are energy flow models which are used to quantify how species interact, energy transfer rates, food web changes, energy balances and reproductive success in the injured species. The primary information needed for these interaction models are population estimates and measurements of energy content of the food web species. This proposed study would provide seasonal somatic energy for two key forage species, herring and pollock, which are known be important in the EVOS area food web.

There are no previous reports on energy allocation, or over-winter mortality, in Alaskan herring. Historical measurements of length, weight, age and roe yields are available in a variety of ADFG, and other agency reports. Work by the authors on Pacific cod demonstrated that energy storage in liver varied by 116% in the two years that it was measured. In cod 46% of the energy channeled to gonads comes from liver and soma, thus reproductive output is directly related to these energy pools. It is reasonable to assume that similar variations, or perhaps even larger fluctuations, exist in energy cycles of herring, but only quantitative sampling will validate this theory.

A considerable amount of laboratory work on growth related bioenergetics of juvenile pollock have been accomplished. For juveniles somatic energy content has been related to condition factor. However, there is no information on intraannual and interannual variation in somatic energy content.

PROJECT DESIGN

A. Objectives

1. Describe the seasonal somatic energy cycle of juvenile and adult herring and juvenile pollock.

2. Describe the spawning energetics and reproductive biology of herring.

3. Examine winter mortality of juvenile herring and critical condition factor.

This project will measure ovulation and reabsorption rates for EVOS Pacific herring and ovarian energy indices relative to condition factor index, disease, somatic energy, and liver energy indices. The seasonal energy content of juveniles will be measured and critical condition factor determined in the laboratory so that estimates of *in situ* winter mortality can be made. For walleye pollock seasonal somatic energy cycles will be described. Collections will include all age classes of pollock commonly preyed upon by bird and mammal species injured by the oil spill.

B. Methods

The methods applied to both pollock and herring will be similar to those used by the investigator in previous bioenergetic studies. Adult herring will be collected every other month and just prior to and after spawning by ADFG and frozen. In the laboratory they will be divided into groups based on sex, length (or age) and condition factor where CF = g wet wt x 100/(cm fork length)^3 as well as disease status. There will be a minimum of 100 fish in each sample. Wet weight will be measured to the nearest tenth of a gram. Fish will be dissected and gonad and liver weight measured. Small subsamples of axial muscle, gonad and liver will be removed for energy measurement. Each fish will be individually tagged and freeze dried. After freeze drying they will be placed in a convection oven at 60°C until they reach a constant weight. Individual wet and dry weight values will be used to calculate the moisture content. Dried individuals will be ground in a mill and measurements of ash and caloric content made. The percentage of ash will be determined by weighing a subsample, placing it in a crucible with a loose fitting top, and heating gradually over 3 h to 600°C and maintaining the temperature for 1 h. The muffle furnace will be allowed to cool to room temperature before opening. Sample energy content will be determined by bomb calorimetry. For juvenile herring and pollock from every sample, whole body energy will be measured but individual organs will not be examined.

Fecundity measurements will be made for 100 herring from each of the study areas based on weight of the ovaries, taking a sample equal to 10% of the ovary weight from each ovary and counting the number of eggs to measure the weight of one egg. Ovary weight times the weight of one egg will provide the estimate of total fecundity. Samples will be taken prior to any observed spawning and after spawning. Estimates of eggs not spawned will be obtained from the post spawning samples.

Herring samples will be taken from two different geographical areas in Prince William Sound. Specific sampling sites will be coordinated with bird and mammal projects. This type of information will provide insight into the extent of geographical variations in somatic energy storage. Critical condition factor for juvenile herring will be measured in the laboratory. The same basic methods outlined for herring will be used for measuring pollock somatic energy content. Samples will be taken from four different geographical areas. Specimens will be captured using small trawls and additional samples will be solicited from researchers who obtain specimens from birds. Specific sampling sites will be coordinated with bird and mammal projects.

Proximate analysis will be carried out on tissue samples using the facilities of a commercial or university service laboratory. Live juvenile herring will be held in the laboratory and measures of conversion efficiency relative to condition factor of fish will be made using modified methods of Paul *et al.*, in press and Harris *et al.*, 1986. Fish will be captured periodically throughout the over-winter period to obtain fish with different condition factors. Herring will be fed commercial fish pellets to determine at what condition factor they have reached the point of no return.

C. Schedule

Samples of both species will be taken over a three year period. A study of this duration is necessary to provide some estimate of what normal values would be for these previously unmeasured parameters. A minimum of three years is needed to observe interannual variations in energy cycles and provide enough data to model condition factor and liver energy storage relative to prespawning ovarian energy.

The milestone chart below outlines the proposed schedule events for the first year of study:

Oct 1 94-Aug 31 95	Bimonthly field sampling for pollock and herring for somatic energy measures
Oct 1 94-Aug 31 95	Sample processing for pollock and herring
June 1 95	Progress report
June 15 95	Renewal proposal
Sept 30 95	Annual report

Years two and three would have similar schedules with the addition of laboratory studies of critical condition factors for juvenile herring. The final report would be completed by January 1, 1998. Modifications in due dates dictated by revisions in the proposal process will be incorporated as required by the funding agency.

D. Technical Support

It is assumed that all collections of herring will be done by the Alaska Department of Fish and Game and that pollock will be collected by the forage fish project so no funding for vessel time is requested. If it proves unfeasible to get samples from the forage fish project then a supplemental request for vessel time will be submitted. All laboratory facilities and equipment needed for this project are available at the Seward Marine Center laboratory.

The data will be fitted to linear, logarithmic, power and exponential curves and the r^2 goodness of fit value used to determine which curve is the best model to describe the interrelationships between size and energy content, season and energy content, condition factor and whole body energy, liver energy and ovarian energy content, or length fecundity relations using SIGMASTAT and SIGMAPLOT software and existing computers. ASCII files will be used to archive the data.

E. Location

Herring samples will be taken in Prince William Sound in conjunction with ADFG sampling. Pollock will be collected around EVOS rookeries and seal feeding areas in conjunction with the forage fish project.

PROJECT IMPLEMENTATION

Virtually all the bioenergetics work on Alaskan marine fish and invertebrates completed to date has been done by the author of this proposal (Dr. A. J. Paul) and his colleagues and all this work has been done at the Seward laboratory. This combination of experience and facility makes IMS Seward a logical place to do fish and invertebrate energetics.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	92.6
Commodities	0.0
Equipment	0.0
Subtotal	95.6
Gen. Admin.	3.8
Total	99.4

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Sound Ecosystem Assessment (SEA)/Prince William Sound System Investigation--Variation in Local Predation Rates on Hatchery-released Fry

Project Number:	95320Y
Restoration Category:	Research (new)
Proposed By:	Prince William Sound Science Center
Lead Trustee Agency:	ADFG
Cost FY 95:	$161,200
Cost FY 96:	$94,800
Total Cost:	Unknown
Duration:	2 or more years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon

INTRODUCTION

The Sound Ecosystem Assessment (SEA) program relies upon testing a set of core hypotheses to achieve its goals of understanding marine production in Prince William Sound. The 'predator-prey relationship' hypothesis of SEA suggests that predation on early life stages of pink salmon and herring is an important modulator of survival, and that the intensity of this predation depends on the availability of alternative prey such as macrozooplankton. Initial carbon budget models suggest that the primary predators on 0-age class fish may be pollock, but there are not sufficient data to state this with certainty. The Pink Salmon and Herring Predation project (94320E) is designed to evaluate the significance of fish predation on 0-age class fishes, focusing on the pink salmon out-migration pathway from fry emergence into the marine environment until the juveniles leave the Sound.

During May 1994 at the Esther Island hatchery (WNH, Lake Bay), SEA researchers noted hundreds of birds, including primarily terns, gulls, and mergansers, feeding near hatchery release sites. The acoustic and net sampling at the same time did not reveal correspondingly high predation by fishes. In contrast, however, the same observations at Evans Island hatchery (AFK) found evidence of juvenile pollock aggregating around fry schools, but did not note substantial bird aggregations. These field observations suggest that in some cases, predation on young fish by birds may be as important as predation by larger fishes. This is a reasonable supposition in light of data from other areas, documenting the importance of avian predation on

schools of small fish at both local and regional scales.

This proposal is for funds to record the size, composition, behavior and duration of foraging aggregations (including mammals, if appropriate) at salmon hatchery release sites. These data will be interpreted in conjunction with results of other projects (that will provide data on prey abundance and distribution) to evaluate the intensity and spatial variation in tetrapod (i.e. bird and mammal) predation on hatchery fry schools, and to test a series of hypotheses explaining that variation. Examination of predation on these hatchery schools of small fish will also provide insight into bird and mammal foraging aggregations on other schooling fish, such as herring or forage fish.

NEED FOR THE PROJECT

Pink salmon are an important resource in Prince William Sound that is not recovering from damage by the *Exxon Valdez* oil spill. Hatchery production of pink salmon fry is an important and economically valuable tool that has been successfully applied to enhance pink salmon populations and fisheries in the Sound. However, variation in the success of pink salmon releases are not currently understood.

Results of SEA and preceding investigations suggest that predation is an important moderator of pink salmon survival, and that bird predation on hatchery-released fry may be at least as important as predation by larger fish. This study is needed to evaluate the localized intensity of predation rates on hatchery-released fry, and to understand the mechanisms generating spatial, seasonal, and year-to-year variation in predation intensity. Results of this study will be useful in designing optimal fry-release strategies to minimize losses to predation. Results may also be generally applicable to understanding the efficiencies of birds and mammals foraging on small, schooling fish, and thus to testing the food limitation hypothesis as an explanation of declines in pelagically foraging bird and mammals.

This project is a component of SEA essential to evaluating the predator-prey relationships hypothesis that predation regulates pink salmon survival and is moderated by the availability of alternative prey. Techniques, equipment, and support structure (e.g. a volunteer program) used in this project may also be applicable to the herring overwintering program under SEA, as understanding localized predation on juvenile herring is one goal of that program. However, no data collection on herring are proposed under this budget.

PROJECT DESIGN

A. Objectives

General

The primary goal of this proposal is to estimate the relative intensity of localized predation on hatchery-released salmon fry for one to two weeks after release, to describe variation in local predation intensity, and to provide tests of hypotheses accounting for this variation. The short period following release is when predation on fry is likely most intense, because 1) fry have not dispersed yet and hence are a locally dense food source, 2) fry are still small, and 3) fry may be unusually vulnerable because they are naive. It is also the period when fry can be most reliably located by researchers, because their location and abundance is known at the time of release.

Field observations and other studies suggest that predation by birds may be substantial relative to predation by fish, and that predation intensity is locally variable. This project proposes four hypotheses to account for spatial, seasonal, and year-to-year variation in local predation intensity on fry:

1. Variation in local predation intensity on fry are determined by the distribution and abundance of alternative prey, including macrozooplankton and other small fish (Prey-switching hypothesis).

2. Variation in local predation intensity on fry is determined by the energetic cost of foraging. Assuming that distance to forager breeding colonies is one measures of energetic costs, since birds must return from foraging trips to this central location. (Energetic costs hypothesis).

3. Variation in local predation intensity on fry is determined by prey vulnerability. Hatchery fry are naive and hence unusually vulnerable (Vulnerable prey hypothesis).

4. Variation in local predation intensity on fry is determined by risk to foragers of feeding. For example, high bald eagle activity in some areas may make foraging there more risky than feeding elsewhere (Risk hypothesis).

These hypotheses address the four variables known to influence feeding rates of predators: missed-opportunity-costs (of foraging elsewhere), energetic costs, success rate, and the risk of foraging.

For 1995

Sampling will be conducted near hatchery release sites in the one to two weeks immediately following release. Sampling will therefore occur between mid-April and mid-May of 1995. Five to ten days of additional sampling will be done in June if a late-release is conducted.

Objectives for this project are:

1. Record size and composition of foraging aggregations near hatchery-release sites following releases.

2. Sample behavior at foraging aggregations to measure dive and capture rate for foragers that bring prey to the surface before consuming them (e.g. gulls and terns).

3. Organize volunteer observers at each hatchery release site in PWS to record the qualitative abundance and composition of foraging aggregations near hatcheries during release and post-release periods. This will provide wider geographic coverage at minimal cost to estimate the extent of variation in foraging aggregations.

4. Opportunistically repeat size/composition and behavior sampling of foraging aggregations located on schools of wild fry. This data will form part of the test of the Vulnerable prey hypothesis

5. Using data from this proposal and from salmon growth, salmon predation, and nearshore acoustic projects, estimate the extent of local predation on hatchery-released fry in the 7-14 days following release.

B. Methods

Data will be collected at two hatcheries (Esther Island and Evans Island), on an alternating schedule designed to include the 7 days following as many releases at each hatchery as possible.

1. Size and composition of foraging aggregations: Foraging aggregations will be observed from a small boat and from shore. Sampling will start at the time of release or slightly before, as foragers are not expected to aggregate at release sites until prey becomes available. All foragers present (including potential predators on foraging birds) will be counted and identified to species if possible, or to species group, and foraging behaviors noted. Aggregations will also be photographed for later counting. Repeated counts throughout the release period will be used to measure variation in the aggregations over time. Data from other SEA and hatchery projects will be used to track the fry schools for up to 14 days post-release.

2. Behavior: Focal-animal sampling will be conducted on-site if possible, and from video tapes otherwise to estimate dive rates for each prominent species (or species-group) of forager and to estimate capture rates for each species that brings food to the surface before consumption (e.g. gulls and terns). Response to and interactions with potential predators (e.g. eagles) will be recorded to estimate impact of predation risk on foraging.

3. Volunteer organization: Each hatchery in PWS will be contacted to recruit volunteers to keep notes and the size and composition of bird aggregations near release sites. Data forms, instructions, binoculars and bird identification guides will be loaned to volunteers as necessary. Volunteers will be asked to daily record foraging aggregations near the hatchery.

4 Opportunistic sampling of aggregations on wild fry: SEA sampling boats are attempting to locate and track wild and hatchery schools of fry. If wild fry schools are located during the field sampling period and are logistically accessible, the same sampling techniques will be used on wild fry schools to estimate predation intensity on wild schools.

5. Analysis: Estimated local predation rates will be calculated from flock size, and dive success rates recorded from focal-animal samples. Variation in predation intensity will be obtained from comparison of the two focal sites, and from the volunteer data set. Hypotheses will be re-examined and evaluated in light of this data.

C. Schedule

Jan - 14 Apr	Organize logistics, purchase equipment and organize volunteers
17 Apr - 19 May	Field work at hatcheries
22 May - 30 Sep	Analysis and report writing

D. Technical Support

This project will require normal hatchery operations to provide fry releases, and is provided logistical support through hatchery operations (equipment and personnel transport, volunteers, lodging). This project benefits from the availability of acoustic and net sampling data from SEA programs including Pink salmon growth and mortality, Salmon predation, and Nearshore fish and acoustics.

E. Location

This research will be conducted in Prince William Sound. Field work will be located at or near hatchery release sites and analysis will occur at the PWS Science Center.

PROJECT IMPLEMENTATION

This research is proposed by and should be conducted by the Prince William Sound Science Center. This work is an integral part of the SEA program and relies on close interaction and access to SEA researchers and data. It is also designed to complement other proposed research involving Science Center collaboration, including components of the SEA Herring program, SEA Predator-prey program, the Science Center proposal to conduct a Forage Fish assessment, and a proposal for sampling foraging efficiencies at food patches.

COORDINATION OF INTEGRATED RESEARCH EFFORT

As part of the SEA program, this project is coordinated with the SEA integrated research effort. SEA coordinating efforts include the SEA Planning and Communication project, SEA Information Systems Modeling. The proposed research contributes to SEA programs on predator-prey relationships, herring overwintering, and modeling. This project is also designed with input from the Pelagic Predators and Nearshore work groups and complements research proposed within those groups. The PI of the proposed work has been and will continue to be an active participant in SEA program and EVOS Trustee meetings to integrate research.

FY 95 BUDGET ($K)

Personnel	6.0
Travel	0.0
Contractual	144.2
Commodities	0.0
Equipment	0.0
Subtotal	150.2
Gen. Admin.	11.0
Total	161.2

Exxon Valdez Restoration Reserve

Project Number:	95424
Restoration Category:	Restoration Reserve (continuation of 94424)
Lead Trustee Agency:	All Trustee agencies
Cost FY 95:	$12,000,000
Cost FY 96:	$12,000,000
Total Cost:	$108,000,000
Duration:	Annual through 2002
Geographic Area:	Oil spill area
Injured Resource/Service:	Multiple resources

INTRODUCTION

Complete recovery from the *Exxon Valdez* oil spill will not occur for decades. Scientists have identified a clear need to establish the capability to act in the years after 2001. For example, some salmon return in cycles of four to six years, and other resources have lives that are much longer. To be effective, activities may have to span more than one generation. Sometimes research is necessary to understand why a resource is not recovering. In many cases, research must precede effective restoration or improved management decisions that will protect a resource or service. For these reasons, some restoration activities may continue for a long time.

Annual payments to the Restoration Fund end September 2001. The *Exxon Valdez* Restoration Reserve provides a location to hold funds for restoration activities after the last annual payment. Allocation of the Reserve to specific activities will be made by the Trustee Council at a later date.

The $12 million of this project would be the second payment toward the *Exxon Valdez* Restoration Reserve. One payment of $12 million was authorized by the Trustee Council on January 31, 1993 as part of the 1994 Work Plan. Additional annual deposits of $12 million payments made each of the remaining seven years would provide a reserve of $108 million plus interest. This amount is expected to be appropriate to carry out long-term restoration activities needed after Exxon payments end.

The *Exxon Valdez* Restoration Reserve could potentially benefit any resource or service injured by the oil spill.

NEED FOR THE PROJECT

The $12 million of this project and future payments to the *Exxon Valdez* Restoration Reserve will fund restoration activities after the annual payments end. Interest earned on the Reserve's principal will remain with the Reserve until needed.

PROJECT DESIGN

A. Objectives

The sole objective for the Reserve is to assure the availability of funds to allow the Trustees to continue restoration activities that are necessary for recovery of resources and services injured by the oil spill after the last annual payment to the Restoration Fund.

B. Methods

Not Applicable.

C. Schedule

Not applicable.

D. Technical Support

Not applicable.

E. Location

Oil spill area.

PROJECT IMPLEMENTATION

The Reserve will be held by the Court Registry. Expenditures from the Reserve will be made only at the direction of the Trustee Council. Any spending from the Reserve must be consistent with the Consent Decrees that established the Restoration Funds and with the Memorandum of Understanding between the state and federal governments.

FY 95 BUDGET

Approximately $12 million each year, FY 1994 through FY 2002, for a total of $108 million (plus interest).

Harlequin Duck Recovery Monitoring

Project Number:	95427
Restoration Category:	Monitoring (continuation of 94427)
Proposed By:	ADFG
Cooperating Agencies:	DOI, NOAA
Cost FY 95:	$226,900 (includes $17,300 for data analysis and report writing of FY 94 work)
Cost FY 96:	$294,700
Total Cost:	Unknown
Duration:	6 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Harlequin duck

INTRODUCTION

Oil spill studies of harlequin ducks in western Prince William Sound (PWS) 1989-93 indicate an initial mortality up to 1,000 birds (spill-wide), consistently low numbers of birds during the breeding season, a lack of breeding activity on suitable streams 1991-92, negligible production of broods through 1993, and an apparent decline in post-breeding molting birds in the region. Two main hypotheses have been followed to explain these findings: (1) ingested oil is continuing to cause mortality and/or sublethal impairment of reproduction; and/or (2) initial mortality caused significant losses to the local western PWS breeding component and subsequent low production. To date, oil has been found in a few harlequins collected during 1989-90 and 1993, and they continue to feed in oiled areas year around. However, no conclusive evidence has been found of histological or physiological effects from oil.

The most important conditions for successful restoration are: (1) establishment of a monitoring program for spring and summer population structure and detection of reproductive effort, and (2) mitigation of physiological impairment that may result from ingesting contaminated foods. Otherwise, natural improvements in productivity or enhancement efforts will be undocumented or ineffectual.

Because of the consequences of a continued harlequin duck reproductive failure, it is particularly important to understand what factors are responsible for limiting reproduction. Given the lack of recovery and the suspected high degree of site fidelity of harlequin ducks, it cannot be assumed that the population in oiled areas will return to pre-spill levels. In fact, the population may continue to decline because of a lack of recruitment and limited immigration. It is necessary both to continue monitoring population and reproductive trends, and identify factors limiting recovery.

The goal of this project is to continue monitoring the harlequin duck breeding population and annual productivity. Proposed surveys will provide trend indices to assess recovery of resident populations of harlequin ducks and determine factors inhibiting or contributing to recovery and restoration. Specific information on habitat associations and structure of the breeding population will provide a measure of recovery or guide development of further investigations. Technical information is applicable to evaluating habitat acquisitions and intertidal habitat restoration projects that benefit a variety of species (e.g. shorebirds, sea otters).

NEED FOR THE PROJECT

Regardless of ultimate causes, collective results of EVOS studies indicate serious population-level concerns for harlequin ducks in western PWS. Prompt focus on specific population parameters is necessary to determine the status and recovery potential of harlequin ducks. Sea duck populations, in general, are composed of long-lived birds that have delayed sexual maturity, low annual production rates, and "boom and bust" years. Consequently, sea duck population dynamics are quite sensitive to adult survival rates, size of the breeding component, and variable breeding propensity (% of adults breeding annually). Data on sex and age composition are very useful in examining these aspects of a population. To date, EVOS projects have gathered abundance and distribution data only on total harlequin ducks, with little information on sex and age composition, or proportions of paired birds. The focus of these projects has been extensive survey coverage and a diverse array of other time-consuming objectives. Also, efficient techniques for the kind of intensive survey required have not been developed for sea ducks.

Currently, there are no sufficiently measured parameters of harlequin population dynamics with which to construct a population model for Prince William Sound. A reliable breeding bird survey is a critical prerequisite to evaluating the remaining reproductive potential in the western Sound and acquiring data to fill in several important model elements. The survey described below is intended to establish quantified restoration goals and implement an effective monitoring program for harlequin ducks in PWS.

Evidence of oil ingestion and physiological effects on harlequin duck reproduction have been investigated through 1993. Some intertidal sites remain contaminated. Nearshore studies (NOAA-NMFS) of intertidal zone recovery and contamination of invertebrates are a vital corollary to the harlequin duck project.

PROJECT DESCRIPTION

A. Objectives

The objectives of this study are to: (1) document abundance, distribution, and age-sex structure of the pre-nesting population in PWS through May-June breeding bird surveys; (2) document annual harlequin production and post-breeding abundance in the EVOS region through brood and molting surveys; (3) Classify streams and shoreline habitats in western Prince William Sound to correlate habitat parameters with eastern Prince William Sound; and (4) pending 1993 results of contaminant analysis of harlequin duck tissues and blood chemistry, document continued exposure of sea ducks to oil and physiological links to reproductive impairment through blood and tissue sampling.

B. Methods

This project uses established methodology including boat surveys of shoreline and suitable breeding streams during May-June throughout PWS, and molting and brood rearing habitats during July and August. Sex-age classification methodology currently being developed will be used to determine population structure during spring and summer surveys. Results from the oil spill area will be compared to 1990-93 results and to data collected in unoiled areas of eastern and southern PWS. Habitat use associations will be recorded during both surveys and integrated with a database being developed from previous work.

Contingent on 1993 results indicating evidence of continued oil ingestion by harlequin ducks or physiological anomalies related to reproduction, an effort may be mounted to sample blood and/or tissues from breeding harlequin duck in 1994 and contract for analytical services. Blood samples could be analyzed for normal blood parameters and abnormalities. Presence of elevated levels of haptaglobins and interleukins in blood sera or positive P450 enzyme activity may indicate continued petroleum exposure if statistically correlated to the oil spill area.

C. Schedule

The course of this monitoring program is projected for five years. Survey schedules are in accordance with the draft EVOS Restoration and Monitoring Plan. This project will be conducted during the 1995 field season, with survey effort focused on May-June and July August periods. Interim analyses and reporting will occur throughout 1995 and early 1996. Contract laboratory analyses should be completed by December 1, 1996. Report preparation will begin in September, and a progress report will be completed before January 30, 1996.

D. Technical Support

If warranted, Dr. D. M. Fry will provide blood chemistry interpretation following analysis of clinical chemistry by California Veterinary Diagnostics, perform plasma electrophoresis for

evidence of protein changes, and provide histologic interpretation of tissues. NOAA-NMFS Auke Bay Laboratory is the preferred source for hydrocarbon analyses of any food items and tissues that are collected. Videography to aid in population structure will be contracted.

E. Location

The proposed project will be conducted in the oil spill area of Prince William Sound and unoiled eastern PWS from Valdez to Cordova. Communities affected by the project include Chenega, Whittier, Valdez, and Cordova.

PROJECT IMPLEMENTATION

This study will be conducted and managed by the Division of Wildlife Conservation, Waterfowl Program, under supervision of the Waterfowl Coordinator. The Alaska Department of Fish and Game has been conducting EVOS harlequin duck investigations and monitoring since 1989. Data collection will be accomplished by Division staff during field periods, with data analyses and reporting assigned to appropriate project participants. The Waterfowl Coordinator will be responsible for administrative and technical aspects of the project, including planning and budget preparation, tracking expenditures, personnel assignments, contract oversight, and quality control of products.

Data collection will be controlled by employee training, supervision and compliance with methods and techniques described in SOPs. Chain-of-custody procedures as outlined in State/Federal Damage Assessment Plan: Analytical Chemistry QA/QC are being followed. Samples and data will be archived at the Department of Fish and Game. The products of this study will be interim and final reports with maps, figures, and tables.

Costs of tissue analysis for petroleum exposure are paid through a contract with NOAA Auke Bay Laboratory. An RSA will be issued for technical support on Harlequin Ducks at University of California, Davis. Costs of videography and editing will be contracted, source to be determined.

COORDINATION OF INTEGRATED RESEARCH EFFORT

There are no other projects directly related to the work planned in this project, although results may be integrated with USFWS boat surveys for birds and mammals and NMFS intertidal invertebrate surveys. Techniques developed on this project will provide a basis for future monitoring efforts for all sea ducks. Subsequent EVOS program development can incorporate sea duck population dynamics information with intertidal and nearshore ecosystem projects.

FY 95 BUDGET ($K)

Personnel	141.2
Travel	8.1
Contractual	24.5
Commodities	18.2
Equipment	12.0
Subtotal	204.0
Gen. Admin.	22.9
Total	226.9

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Data Analysis for Stream Habitat

Project Number:	95505B
Restoration Category:	Habitat Protection (continuation of 94505)
Proposed By:	USFS
Cost FY 95:	$17,200
Cost FY 96:	$0
Total Cost:	$17,200
Duration:	1 year
Geographic Area:	Prince William Sound, Kenai Peninsula, and Kodiak Island Area
Injured Resource/Service:	Multiple resources

INTRODUCTION

Preliminary data collected on the Kenai Peninsula suggests that channel types, as defined from aerial photographs, may be a predictor of at least several micro habitats found in a stream channel. A multivariate analysis of variance indicated that channel types were a significant predictor ($P<0.0001$) for eight of thirteen microhabitats (e.g., rapids, plunge pools, and dammed pools). Further data collection for the Oil Spill Trustee Channel Type Classification Study indicated that channel types are also a significant predictor of the amount of spawning and rearing habitat in a given segment of stream.

NEED FOR THE PROJECT

Rates of salmon mortality are highest during their early stream-dwelling life stages. Because mortality is often related to the condition and availability of in-stream habitat, it is critical that habitat limiting to juvenile salmon be protected or restored. Basin-wide in-stream habitat surveys are essential to predict those habitat conditions that limit survival. In remote areas of Alaska it is impractical to physically survey all streams within a given drainage, therefore, a hierarchical approach that lends itself to photo interpretation would greatly increase the efficiency of large scale habitat inventories.

PROJECT DESIGN

A. Objective

1. Complete data analyses and professional publication for an existing stream habitat data base.

2. Establish the relationship between channel type designations and the presence of in-stream micro habitat (spawning and rearing).

B. Methods

Existing data bases will be analyzed to firmly establish the relationship between aerial photo channel type interpretation, and the presence of in-stream habitat (spawning and rearing). In addition, results will be published in a professional fisheries management journal. These analyses and the publication will serve as a basis for any larger scale in-stream habitat surveys that are tied to the Channel Type Classification Study and habitat protection proposals.

C. Schedule

Data analysis and report preparation will be performed during January through April 1995.

D. Technical Support

None.

E. Location

Data for Prince William Sound, Kenai Peninsula and Kodiak Island Area streams will be analyzed. Data analysis and report preparation will occur in Anchorage, Alaska.

PROJECT IMPLEMENTATION

This project will be implemented by USFS personnel.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is an extension of previous projects designed to provide comparative evaluations of fish habitat within comparative evaluation parcels.

FY 95 BUDGET ($K)

Personnel	10.4
Travel	0.0
Contractual	4.0
Commodities	1.0
Equipment	0.0
Subtotal	15.4
Gen. Admin.	1.8
Total	17.2

Exxon Valdez Oil Spill Trustee Council
645 "G" Street Suite 401
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Attn: Comments on Draft FY 95 Work Plan

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Project Title Pigeon guillemots and river otters as bioindicators of nearshore ecosystem health in Prince William Sound.

Project # 95025C Revised 8/3/94

Proposed By Daniel D. Roby, Assistant Unit Leader
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Cost FY 95 $189,593

Cost FY 96 $195,559

Cost FY 97 $176,018

Cost Total $561,170

Duration 3 years (Completion date 9/30/98)

Geographic Area Prince William Sound

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B. INTRODUCTION

This study is relevant to EVOS ecosystem research because it is designed to develop a better understanding of how petroleum hydrocarbon pollution affects the nearshore marine environment in Prince William Sound (PWS). Results from this study will allow us to test biostatistical models that predict ecosystem health and environmental deterioration. Use of bioindicators will lead to a better understanding of ecosystem processes in PWS. Our proposal describes a research approach for assessing the biological and ecological significance of contaminants present in the environment. In this research our focus is the pigeon guillemot (Cepphus columba) and river otter (Lutra canadensis)

as indicators of environmental stress.

The guillemot and river otter models will be used as upper trophic level sentinels of bioavailable contaminants, such as oil, and as surrogates to estimate the potential exposure and risk to other organisms that are components of the PWS nearshore ecosystem (Leighton 1985; Peakall et al. 1986). This research approach utilizes biomarkers (biochemical and cellular indicators of exposure), reproduction rates, and data on mortality to identify and quantify the present level of variability within the PWS ecosystem. This approach is necessary because evaluation of the potential for exposure to contaminants in the environment is extremely complex due to the differences in the biological availability of contaminants at different trophic levels and varying toxicological interactions within exposed organisms.

Focusing on the biological responses in indicator species overcomes many of the limitations that plague chemical analysis of the environment (Payne et al. 1987). While measuring body burdens is an important aspect of using a biomonitor, equally important is the measurement of biomarkers because they:

1) Provide evidence of exposure to compounds that do not bioaccumulate or are rapidly metabolized;

2) Integrate the toxicological interactions resulting from exposure to complex mixtures of contaminants;

3) Present a biologically relevant measure of the cumulative adverse effect; and

4) Measure early responses of organisms to toxicant exposure and serve as short-term predictors of long-term adverse effects.

By proper selection of a bird and a mammal from an upper trophic level, specific sources and routes of exposure can be identified. Analysis of biological markers in birds and mammals may offer a means of identifying exposures due to toxic sites from those due to other natural exposures. In guillemots we will measure induction of immune system, acute phase proteins, and cytokines as biomarkers. We will compare our results from guillemots with previous work on other bird species (Fry and Lowenstine 1985), our PWS work on river otters (Lutra canadensis), and results from current research on guillemots in Kachemak Bay. The earlier work on river otters and our current work on guillemots in Kachemak Bay will validate our study of guillemots and river otters in PWS and our biostatistical model. This model (Duffy et al. in press) is far more detailed than those for any bird, and maintains a mammalian component for human comparisons. While guillemots are easier to capture and handle than otters during the breeding season, including otters as a component of the research may be essential because guillemots are principally available during nesting, whereas otters are year-round residents.

The purpose of our study is to assess whether populations of pigeon guillemots and river otters in PWS are recovering from the effects of the Exxon Valdez oil spill, and, if not, why this might be the case. We will test hypotheses that relate to possible routes of hydrocarbon contamination in the top-level predators, and use biomarkers to assess the effects of such contamination on the health of these populations. Finally, our study will provide information necessary to restore populations of guillemots and river otters, should such actions be required.

Our project is closely integrated with other research designed to assess the effects of the oil spill on nearshore vertebrate predators and their prey. We have proposed the only project that will evaluate predators that feed primarily on marine fishes in the nearshore environment. Moreover, results from our investigations are essential to provide an understanding of whether these injured resources are recovering, and what role lingering effects from oil contamination might play in the overall health of the Prince William Sound ecosystem.

C. PROJECT NEED

Pigeon Guillemots

We are currently developing pigeon guillemots as an avian bioindicator for coastal ecosystems in Alaska. This research is currently underway in Kachemak Bay, Alaska, and will provide crucial baseline information for the proposed work in PWS. Guillemots are the most neritic members of the marine bird family Alcidae, which includes the murres, puffins, and auks. Pigeon guillemots are the best-suited species for monitoring nearshore ecosystem health for several reasons: (1) they are a common and widespread seabird species breeding in coastal Alaska, and in PWS specifically (Sowls et al. 1978, Sanger and Cody 1993); (2) they forage within 5 km of the nest site in the subtidal and nearshore zones (Drent 1965, Kuletz 1983); (3) unlike most seabird species, they do not breed in large, dense colonies; (4) they raise their young almost entirely on fish, preying primarily on intertidal and nearshore bottomfish (e.g., blennies, sculpins) and on nearshore schooling fish (e.g., sandlance; Drent 1965, Kuletz 1983); (5) the one- or two-chick broods are fed in the nest until the young reach adult body size.

Guillemots first breed at 2 years of age and adults have high annual survivorship (85%, Asbirk 1979). Young guillemots normally return to the natal area to breed. Nest site fidelity of breeding pairs is high and even in instances when pairs relocate nests, the distances involved are usually small (< 30 m). Eggs are laid in a wide variety of natural crevices and holes, but most nest sites in the study area are located in cavities in rock masses (K. Kuletz and K. Oakley, pers. comm). Eggs are usually laid about 50 cm from the entrance of the nest crevice (Asbirk 1979), thus eggs, chicks, and attending adults are frequently accessible for data collection. Guillemots are unusual among alcids in that they normally lay two-egg clutches and raise two chicks per nesting attempt. Guillemots carry whole fish in their bills to the nest-site crevice to feed their young. Thus individual prey items can be identified, weighed, measured, and, if necessary, collected for contaminant analyses.

Other potential avian bioindicators of Alaska coastal ecosystems are unsuitable for several reasons. Larus gulls (e.g., glaucous-winged and herring gulls) have been used as models for studies on the sublethal effects of crude oils on marine birds (Peakall et al. 1982; Miller et al. 1978; Lee et al. 1985, 1986) and are widespread and common components of Alaska coastal ecosystems. But gulls frequently feed at dumps and scavenge fish offal from fishing vessels where exotic contaminants may be encountered. Larus gulls may also commute long distances to utilize these food sources; consequently the source of anthropogenic contaminants in the diet may be difficult to determine. Other alcid species (e.g., puffins, murres) and kittiwakes (Rissa tridactyla) forage offshore (up to 100 km from the nest site) on pelagic schooling fish and are restricted to breeding at a few relatively inaccessible colonies in the study area. Thus they are inappropriate bioindicators of nearshore ecosystem health and potential contaminants in food webs close to breeding colonies. In addition, these species are sensitive to social stimulation at the breeding colony. Thus direct mortality from

plumage oiling can result in reduction of colony-wide reproductive success even in the absence of a contaminated food supply. Other alcids that forage in the neritic zone and are noncolonial (e.g., marbled murrelet) may nevertheless forage at considerable distance from nest sites, and active nests high in mature timber are extremely difficult to locate and monitor.

Guillemots have served as subjects in previous studies to assess the effects of ingested crude oil on marine birds (Peakall et al. 1980). Nestling black guillemots (Cepphus grylle), a very closely-related sibling species of the pigeon guillemot, were fed single doses of weathered South Louisiana crude oil (WSLC) and subsequently monitored in their natural nest site where they were cared for by their parents. These experiments demonstrated that single doses of as little as 0.1 ml WSLC resulted in declines in growth rates, increases in plasma sodium levels and increases in nasal and adrenal gland masses. The effects of the single dose were not transient, as nestlings that were dosed at roughly two weeks post-hatch were 20% lighter than controls at five weeks of age (just prior to fledging). Such persistent sublethal effects may have serious consequences for post-fledging survival. Peakall et al.'s (1980) study clearly demonstrates that guillemot nestlings living normally in their chosen habitat are tolerant to the handling and disturbance associated with assessing pollutant toxicity.

We will monitor blood parameters in pigeon guillemots breeding at Naked Island (oiled area) and Fool Islands (non-oiled area), PWS. Data on population size, reproductive success, prey composition and provisioning rates of breeding guillemots will be collected at these same sites as part of an on-going research project conducted by the Fish and Wildlife Service and directed by Dr. David Irons. Collection of blood samples nestling and adult guillemots will be coordinated closely with Dr. Irons' field crew. Naked Island supports the highest breeding densities of guillemots in PWS (Sanger and Cody 1993) and a breeding population that is adequate for the proposed research (Oakley 1981, Kuletz 1983). The following parameters will be measured at accessible guillemot nests, in coordination with Dr. Irons' studies, as indices of parent-offspring productivity: (1) chick feeding rates; (2) chick meal size; (3) taxonomic composition of chick diets; (4) biochemical composition of chick food items; (5) chick growth rates and body composition; (6) nestling survival; and (7) fledging age, body mass, and body composition. Productivity will be compared with blood parameters used to monitor contaminant exposure. Nondestructive indices to stress induced by petroleum hydrocarbon ingestion will be used, such as levels of selected plasma immunoglobulins, blood plasma proteins, cell counts, and interleukin levels in blood of adults and chicks, body mass and body composition of adults and chicks, chick growth rates, and fledgling mass. These data will then be used to evaluate the factors that limit guillemot productivity. The results of this research project will provide us with the background necessary to use guillemots as avian indicators of nearshore ecosystem health in PWS.

The population status of pigeon guillemots in PWS and the northern Gulf of Alaska has been of concern for nearly a decade due to declines in number of adults observed on survey routes (Klosiewski and Laing, unpubl. data). Low fledging success has been attributed to changes in the abundance and distribution of forage fish resources within foraging range of guillemot nests. There is a troubling lack of information on the factor(s) responsible for poor reproductive performance (Oakley and Kuletz, unpubl. ms.).

River Otters

River otters inhabiting marine environments make extensive use of, and concentrate their activities

in intertidal and subtidal zones (Bowyer et al. in press; Dubuc et al. 1990; Larsen 1984; Woolington 1984). These high trophic-level carnivores are long-lived (> 12 years of age--Doctor et al. 1987), and occur at densities of 0.2-0.8 otters/km of shoreline throughout the Gulf of Alaska (Testa et al. in press). River otters are extremely sensitive to aquatic pollutants, yet continued to reside within the area of oil-contaminated shorelines in Prince William Sound, Alaska following the Exxon Valdez oil spill (Testa et al. in press). These characteristics make river otters an excellent model for assessing the effects of marine pollution on mammals, and provide an overall index to the health of the nearshore ecosystem.

River otters living in marine environments consume a diet dominated by marine fishes, which they prey upon in intertidal and subtidal zones, although they also consume a wide variety of marine invertebrates (Bowyer et al. in press, Larsen 1984, Stenson et al. 1984.). Such nearshore areas are the most often affected by pollution. For instance, oil spilled from the Exxon Valdez contaminated extensive areas of the intertidal and subtidal environments, which was reflected in a loss of dietary diversity for otters inhabiting oil-contaminated shorelines (Bowyer et al. in press). Likewise, river otters living in oiled areas exhibited a significantly lower body mass (when controlled for sex and total body length) than did otters inhabiting oil-free areas (Duffy et al. 1993). Otters have extremely large home ranges (20-40 km of shoreline--Bowyer et al. in review, J. Mammal.), and hence integrate the effects of pollution over wide areas.

Population dynamics of European otters (Lutra lutra) in coastal areas have been linked to the abundance of marine fishes (Kruuk et al. 1991); this is also likely the case for river otters inhabiting PWS. We previously demonstrated that the diversity of otter diets declined significantly following the Exxon Valdez oil spill (Bowyer et al. in press). Similarly, the body mass of otters was significantly lower on oiled, compared with non-oiled, areas of PWS (Duffy et al. 1993, in press). Unfortunately, we were unable to determine whether such changes were caused by toxicological effects of oil on otters, changes in prey availability, or loss of habitat (Bowyer et al. in press a). We were unable to resolve this question because too few otter study sites were also sampled by those studying fishes. We have overcome this problem in the present study by close coordination with the sea urchin proposal (95087). We will share study areas with this project, and Steve Jewett has agreed to sample fishes along the same underwater transects used to sample urchins -- this will add no additional cost to either proposed study. Fish along transects will be identified to the lowest possible taxon; gadiforms, coitids, and other fish will be speared opportunistically. These samples will be frozen and archived for potential future analyses. If biomarkers from otter blood indicate exposure to oil and no oil residue is recovered from the pelage of otters, then we will evaluate these fish for oil contamination (e.g., cytochrome P-450 analysis). Oil contaminated fishes likely persist in PWS (S. Jewett, pers. comm.; Duffy et al. in press), but we believe contamination of pelage and subsequent grooming by otters is a more likely route of oil exposure (Duffy et al. 1994, Baker et al. 1981). Although river otters do consume mussels (Myrilus edulis) in PWS (Bowyer et al. in press), we were able to reject otters feeding on mussels as a hypothesis to explain elevated biomarkers in river otters (Duffy et al. in press).

We will evaluate changes in population trends of river otters by examining the frequency of latrine site abandonment on oiled and non-oiled areas. Kruuk et al. (1989) demonstrated a strong positive relationship between number of resident females and number of active holts (latrine sites) for European otters living in a marine environment. Likewise, Testa et al. (in press) showed that number of active latrines varied with estimated population size for river otters in PWS; however, too few areas were sampled to establish a regression line between these variables. Nonetheless, it is

likely that abandonment of latrines provides a useful index to otter abundance, and can be used to evaluate trends in otter populations. Indeed, Duffy et al. (1994) documented that river otters throughout oiled areas of PWS abandoned latrine sites at a rate over three times greater than did otters inhabiting non-oiled areas. We will not be sampling all of the same areas we previously examined because of integration with other studies of vertebrate predators in the nearshore environment. If differences in oiled and non-oiled areas still exist, it would be possible in subsequent years to evaluate the same sites that we sampled in 1991 to compare current values against that benchmark. Measuring trends in otter populations will not increase the costs of this study because we must evaluate these sites in the process of setting live-traps for otters in order to collect blood samples for biomarker assays.

We previously developed a nonlethal method for evaluating the effects of marine pollutants (in this instance, crude oil) on the blood-enzyme chemistry of river otters (Duffy et al. in press). We first noted that blood haptoglobins (an acute-phase protein) were elevated in otters inhabiting areas where crude oil was prevalent one year following the oil spill (Duffy et al. 1993). Even two years after the oil spill and a major effort to clean oil-contaminated shores, we were able to construct a biostatistical model, using logistic regression, in which we classified $> 86\%$ of river otters correctly as having been captured in oiled or non-oiled zones. This highly sensitive model used only blood values for haptoglobin, interleukin 6 (a cytokine), and AST (a liver enzyme). Our approach has already been extended for evaluating other marine mammals (Zenteno-Savin et al. 1993), and may be applicable to other vertebrates, especially marine birds. The strength of this line of research is that we have already developed the expertise necessary to live-capture river otters, have base-line data from oiled and non-oiled areas throughout Prince William Sound, and have a predictive model that assesses the effects of oil contamination on otters, thereby providing an index to environmental health. Coupling our knowledge of otters with similar physiological data for pigeon guillemots will provide a sensitive tool for examining the health of nearshore ecosystems.

D. PROJECT DESIGN

1. Objectives

This proposal's overall goal is to identify the internal dosage of oil-related pollutants received by piscivorous birds and mammals foraging in the nearshore ecosystem of PWS, Alaska through measuring key parameters associated with biochemical toxicity. Thus, we will quantify the biochemical changes in birds and mammals inhabiting this fragile ecosystem. Guillemots and river otters will provide insight into the pathways and effect (if any) on food webs and the long-term health of the ecosystem. The objectives of this study are to:

1) Identify guillemot nest sites and river otter latrine sites;

2) More accurately assess the effects of oil exposure. It is our intent to collect blood from guillemots and river otters in several areas of PWS to establish control areas;

3) Use blood samples from the guillemot and river otter populations to determine levels of acute phase blood proteins such as haptoglobin, albumin and metalothionine, which are indicative of exposure and tissue damage. We also will measure cytokines such as IL-1 and IL-6 and liver enzymes such as AST;

4) Supplement our molecular work by cellular studies such as red cell volume, hematocrits and immune functions (Heinz bodies will be looked for in guillemot and river otter samples);

5) Generate risk-assessments based on these biomarkers; and

6) Measure trophic level using stable isotope analysis of guillemot samples and plants and scats from river otter latrine sites.

This proposal will produce background values for selected biomarkers and allow the development of "blood associated indices" of environmental stress in mammals and birds. These indices will be useful in comparing current and future levels of petroleum hydrocarbon contamination in PWS.

2. Methodology

Pigeon Guillemots

Field studies will be conducted during the 1995, 1996, and 1997 breeding seasons in PWS, Alaska. Approximately 800 pigeon guillemots nest along the shores of Naked Island (Sanger and Cody 1993). Seventy-five active and accessible nests will be located and marked during early incubation in each of the three breeding seasons, in coordination with on-going U.S. Fish and Wildlife Service studies of guillemot reproductive success in oiled and non-oiled areas of PWS. These nests will be closely-monitored until the young fledge or the nesting attempt fails. Known-age chicks will be weighed regularly to determine individual growth rates throughout the nestling period. Blood samples (1 ml) will be collected by brachial vein puncture from each nestling at ages 20 and 30 days post-hatch (guillemot chicks normally fledge at 30-40 days post-hatch). These blood samples will be collected using SOPs developed by us during the Exxon Valdez spill studies to preclude sample contamination. Blood samples will be analyzed for molecular and cellular biomarkers (e.g., characteristic morphological lesions of red blood cells associated with hemolytic anemia caused by oil ingestion [Leighton 1985]). Total body fat of chicks at 20 and 30 days post-hatch will be determined by noninvasive measurement of total body electrical conductivity (Walsberg 1988). Body mass and total body fat measurements will be used to develop a condition index for each chick at 20 and 30 days post-hatch.

The impact of contaminant exposure on breeding adults will be monitored using a combination of direct and indirect methods. Attentiveness of adults will be monitored during the incubation period. Frequency of chick meal delivery and meal size will be determined during the chick-rearing period by a combination of monitoring adult nest visitation rates and periodic weighing of chicks. Individual variation in exposure of adults (and chicks) to petroleum hydrocarbons will be monitored by periodically collecting food samples from adults as they return to the nest site to feed chicks and by collecting prey samples at sea. In the lab, samples of chick food will be analyzed to determine levels of aliphatic and aromatic hydrocarbon fractions using an Iatroscan MK-5 TLC/FID Analyzer System. During the chick-brooding period (0-7 days post-hatch), adult guillemots will be captured in the nest crevice, banded for later identification, and blood samples (1 ml) collected from the brachial vein. Blood samples will be analyzed for molecular and cellular biomarkers of contaminant exposure using the same techniques applied to chick blood samples. These measurements will allow us to monitor the impact of various levels of contaminant exposure on physiological condition of chicks and foraging efficiency of adults.

River Otters

Otters, which are relatively abundant in PWS, will be captured using Hancock live traps (Melquist and Dronkert, 1987) placed on trails at latrine sites and monitored by means of a trap transmitter (Telonics, Mesa, Arizona, USA) that signals when a trap was sprung. We have used this method successfully in the past (Duffy et al. 1993, in press). The otter initially will be immobilized in the trap with a hand injection of ketamine hydrochloride (11 mg/kg estimated body weight, Sigma, St. Louis, Missouri, USA) and placed in a drugging box (Melquist and Hornocker, 1983). Weights and measurements (see Duffy et al. 1993) will be taken and the blood sample drawn from the jugular vein. Sexes will be distinguished by the relative position of urogenital openings and palpitation of the baculum (Larson 1984). Age determinations will be based on tooth wear and overall size of otters (Stephenson 1977).

Analyses

During the past 15 years, xenobiotics have been shown to alter immune function (Sharma 1981, Fowles et al. 1993). Environmental chemicals interact with various parts of this complex system resulting in either suppression or hypersensitivity of immune activity and surveillance. A panel of biomarkers, including leukocyte counts, macrophage function, electrophoretic measurements of serum immunoglobins, and ELISA assays of interleukins will provide data on the health status of organisms and permit comparison of species.

At UAF, we will perform haptoglobin assays, IL-1 and IL-6 assays, and immunoglobin typing assays for the blood samples collected during this project. Cell counts will be performed by NBS contracted lab and macrophage function assays will be developed.

The following biomarker analyses will be performed on the samples (Fossi and Leonzio 1993): blood plasma protein and liver enzymes, cell counts and Heinz bodies, and interleukin levels. The following organism analyses will be performed for guillemots: reproductive success, nest and site abandonment, trophic level using stable isotope ratios of guillemot tissues and prey.

In the area of data analysis and interpretation, we plan on linking our data with the results on sea otters and nearshore invertebrates in PWS. Proposed studies on invertebrates, sea otters, and ours on guillemots and river otters in PWS gives these studies a holistic ecosystem approach. All data from this study will become public information. The data will be forwarded to the EVOS Trustee Council in journal format for archiving. Also, the data will be available to the public through the use of peer reviewed journals. Any different format will be mutually agreed to.

3. Schedule

Field work in Prince William Sound will be conducted during spring and summer 1995, 1996, and 1997. Data collection during three field seasons will be necessary to provide minimal information on interannual variation in reproductive success and blood chemistry of guillemots and morphometrics and blood chemistry of river otters. Guillemots normally lay eggs from late May to late June and raise their young during July and early August. Active, accessible nests of the study species will be located and marked early in the incubation period during late May and early June. Marked nests will be checked daily during the hatching period to determine hatching date, and chicks will be banded soon after hatching so that individual growth rates can be monitored

throughout the nestling period. Blood samples from chicks will be collected throughout the nestling period. Chicks will be monitored throughout the nestling period to determine growth rates, fledgling age and mass, and survival until fledging. River otters are most easily live-trapped in late April and early May; we will concentrate our efforts during this period.

Following the field season, guillemot and river otter blood samples will be analyzed in the lab. These analyses will be completed before the next field season to determine the results prior to collecting additional samples from the field. A draft annual report will be prepared in April and a final report will be submitted in June. Following the analysis of samples collected during the 1997 field season, data collected during the three field seasons will be analyzed by May 1998 for relationships between blood bioindicators and reproductive success for guillemots, and between morphometrics and blood chemistry for otters (see Duffy et al. 1993, 1994, in press). The results of these analyses will be prepared in manuscript form and submitted by the end of FY 1998.

4. Technical Support

Laboratory analyses of the blood chemistry of guillemots and river otters will be conducted in the laboratory of the Co-PI (LKD). Standard blood clinical panel and ELISA analyses of oil on pelage and plumage will be subcontracted to other laboratories. No new laboratory equipment will need to be purchased for the proposed research with funds provided by the grant. A laboratory technician will be employed to help the Co-PI and graduate research assistant with IG and HP analyses in blood, and with performing of routine laboratory analyses.

5. Location

The proposed field work will be conducted in PWS. PWS supports accessible breeding population of guillemots that are more than adequate for the proposed research. Field work on guillemots will be conducted at breeding colonies on Naked Island, Fool Island, and Jackpot Island. Approximately 800 pigeon guillemots nest along the shores of Naked Island (Sanger and Cody 1993). The Naked Island base camp would offer an ideal base for field studies on guillemots (D. Irons, pers. comm.), and Naked Island supports the highest breeding densities of guillemots in PWS (Sanger and Cody 1993). Fool Island has approximately 80 guillemot nests and Jackpot Island has about 60 guillemot nests and pairs are breeding at high densities in both sites (G. Sanger, pers. comm.). Naked Island also supports high densities of river otters, and we already have baseline data for otters on Naked Island and northern Knight Island.

The at-sea foraging distribution of pigeon guillemots near Naked Island, Fool Island, and Jackpot Island has been the subject of previous study (Sanger and Cody 1993), as has the species composition of the diet (Kuletz 1983). A field camp operated by the U.S. Fish and Wildlife Service is available for field workers on Naked Island and is within walking distance of colonies where adequate numbers of accessible guillemot nests are available.

E. PROJECT IMPLEMENTATION

The proposed research will be implemented by the University of Alaska Fairbanks, with assistance from and in cooperation with U.S. Fish and Wildlife Service and Alaska Department of Fish and Game biologists with expertise on the proposed study species in the proposed study area. The PI (D. D. Roby) has extensive experience with studies of the reproductive biology of high latitude seabirds

and the relationship between nestling growth and productivity. L. K. Duffy has extensive experience conducting blood analyses, including previous oil spill research. R. T. Bowyer has developed and published a habitat model that will help insure the capture of river otters (by trapping in the most productive areas) and has numerous other publications on river otters. The PI and Co-PI (LKD) currently have in their laboratories the analytical equipment necessary to accomplish the proposed laboratory analyses and they are familiar with the relevant analytical procedures. To the PIs' knowledge, the expertise and equipment necessary for the proposed research are not available within the federal and state agencies that compose the Trustees Council. The PIs will be assisted by a Graduate Research Assistant (Ph.D. candidate), Field Technicians, and undergraduate field assistants who will be carefully selected from the applicant pool as qualified to participate in the proposed research.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

The research described in this proposal dove-tails nicely with on-going research to assess factors limiting recovery of seabird and mammal populations damaged by EVOS. It is also relevant to efforts toward developing seabird and mammal models as upper trophic level sentinels of contaminants and changes in the availability of fish for vertebrate predators. The proposed research approach utilizes biomarkers to help identify and quantify the health of vertebrate predators within the PWS ecosystem. This approach is necessary because of the extreme complexity of assessing contaminant exposure due to temporal and spatial variability and unpredictability in PWS.

Cooperators include Dr. David Irons of the Migratory Bird Branch, U.S. Fish and Wildlife Service. Dr. Irons has had extensive experience working in the field with both guillemots nesting in PWS, and is project leader for on-going studies of the reproductive success and status of these two species in PWS. Close coordination with Dr. Irons' research teams at Naked Island will be essential for the success of the proposed research.

G. PUBLIC PROCESS

The ideas, methods, and scope of work encompassed in this proposal were introduced and refined at both the April 1994 EVOS restoration planning workshop and at a follow-up meeting of public and government representatives interested in nearshore ecosystem research. Similar opportunities for public input will be available on an annual basis, including two winter workshops sponsored by the Exxon Valdez Spill Restoration Office.

All the data generated during the proposed study will be duplicated, with one copy each remaining in the permanent files of the PI and Co-PIs at the University of Alaska Fairbanks, and an additional copy will be retained by the Graduate Research Assistant. The Exxon Valdez Trustees Council Restoration Office and any other interested scientist, organization, or agency will be supplied with copies of any reports, thesis, or publications that result from the proposed research. The results of the proposed study will be part of the dissertation of the Graduate Research Assistant.

Quarterly reports and annual reports will be provided to the Trustees Council (1 abstract 1996, 1 paper 1997). We will provide baseline data on certain biomarkers in guillemots and river otters. We will further test a predictive models developed during earlier Exxon Valdez oil spill studies that already are established for otters (and other mammals) and develop baselines for guillemots (1 paper 1998). Graduate students and undergraduates will gain field and laboratory experience.

H. PERSONNEL QUALIFICATIONS

Please see attached CVs of the PI and Co-PIs.

I. LITERATURE CITED

Asbirk, S. 1979. The adaptive significance of the reproductive pattern in the black guillemot, Cepphus grylle. Vidensk. Meddr. dansk naturh. Foren. 141:29-80.

Baker, J. R., A. M. Jones, T. P. Jones, and H. C. Watson. 1981. Otter Lutra lutra mortality and marine pollution. Biological Conservation 20:311-321.

Bowyer, R. T., J. W. Testa, J. B. Faro, C. C. Schwartz, J. B. Browning. In press. Changes in diets of river otters in Prince William Sound, Alaska: effects of the Exxon Valdez oil spill. Can. J. Zool.

Docktor, C. M., R. T. Bowyer, and A. G. Clark. 1987. Number of Corpora Leutea as related to age and distribution of river otters in Maine. J. Mammal. 68:182-185.

Drent, R. H. 1965. Breeding biology of the pigeon guillemot, Cepphus columba. Ardea 53:99-159.

Dubuc, L. C., W. B. Krohn, and R. B. Owen, Jr. 1990. Predicting occurrences of river otters by habitat on Mount Desert Island, Maine. J. Wildl. Manage. 54:594-599.

Duffy, L. K., R. T. Bowyer, J. W. Testa, and J. B. Faro. 1993. Differences in blood haptoglobin and length-mass relationships in river otters (Lutra canadensis) from oiled and nonoiled areas of Prince William Sound, Alaska. J. Wildl. Dis. 29:353-359.

Duffy, L. K., R. T. Bowyer, J. W. Testa, and J. B. Faro. 1994. Chronic effects of the Exxon Valdez oil spill on blood and enzyme chemistry of river otters. Environ. Toxicol. Chem. In press.

Duffy, L. K., R. T. Bowyer, J. W. Testa, and J. B. Faro. In press. Evidence for recovery of body mass and haptoglobin values of river otters following the Exxon Valdez oil spill. J Wildl. Diseases.

Duffy, L. K., R. T. Bowyer, J. W. Testa, and J. B. Faro. In press (a). Habitat selection and home ranges of river otters in a marine environment: Effects of the Exxon Valdez oil spill. J. Mammalogy.

Fossi, J. C., and C. Leonzio (eds.). 1993. Nondestructive biomarkers in vertebrates. Lewis Publ., Boca Raton, FL. 345 pp.

Fowles, J. R., A. Bairbrother, M. Fix, S. Schelder, and N. I. Kerkobet. 1993. Glucocorticoid effects on natural and humoral immunity in mallards. Dev. Comp. Immunol. 17:165-175.

Fry, D. M., and L. J. Lowenstine. 1985. Pathology of common murres and cossin's auklets exposed to oil. Arch. Environ. Contam. Toxicol. 14:725-737.

Hall, R. J., and N. C. Coon. 1988. Interpreting residues of petroleum hydrocarbons in wildlife tissues. U.S. Fish Wildl. Serv., Biol. Rep. 88(15). 8pp.

Hill, J., and P. A. Tumoi. 1990. Field test for detecting crude oil on the fur of sea otters. U.S. Fish and Wildl. Serv., Biol. Rept. 90:95-122.

Klosiewski, S. P., and K. K. Laing. ms. Marine bird populations of Prince William Sound, Alaska, before and after the Exxon Valdez oil spill. Bird Study No. 2. Final Report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.

Kruuk, H., A. Morehouse, J. N. H. Conroy, L. Durbin, and S. Fears. 1984. An estimate of numbers and habitat preferences of otters Lutra lutra in Shetland, U.K. Biological Conservation 49:241-254.

Kruuk, H., J. N. H. Conroy, and A. Morehouse. 1989. Recruitment to a population of otters

(Lutra lutra) in Shetland, in relation to fish abundance. J. Applied Ecology 28:95-101.
Kuletz, K. J. 1983. Mechanisms and consequences of foraging behavior in a population of breeding pigeon guillemots. M.S. Thesis, Univ. of California, Irvine. 79 pp.
Larsen, D. N. 1984. Feeding habits of river otters in coastal southeastern Alaska. J. Wildl. Manage. 48:1446-1452.
Lee, Y.-Z., F. A. Leighton, D. B. Peakall, R. J. Norstrom, P. J. O'Brien, J. F. Payne, and A. D. Rahimtula. 1985. Effects of ingestion of Hibernia and Prudhoe Bay crude oils on hepatic and renal mixed function oxidase in nestling herring fulls (Larus argentatus). Environ. Res. 36:248-255.
Lee, Y.-Z., P. J. O'Brien, J. F. Payne, and A. D. Rahimtula. 1986. Toxicity of petroleum crude oils and their effect on xenobiotic metabolizing enzyme activities in the chicken embryo in ovo. Environ. Res. 39:153-163.
Leighton, F. A. 1985. Morphological lesions in red blood cells from herring fulls and Atlantic puffins ingesting Prudhoe Bay crude oil. Vet. Pathol. 22:393-402.
Melquist, W. E., and M. G. Hornocker. 1983. Ecology of river otters in West Central Idaho. Wildl. Monogr. 83:1-60.
Miller, D. S., D. B. Peakall, and W. B. Kinter. 1978. Ingestion of crude oil: Sublethal effects in herring full chicks. Science 199:315-317.
Oakley, K. 1981. Determinants of the population size and distribution of the pigeon guillemot (Cepphus columba) at Naked Island, Prince William Sound, Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks. 65 pp.
Oakley, K., and K. J. Kuletz. ms. Population, reproduction and foraging ecology of pigeon guillemots at Naked Island, Prince William Sound, Alaska, before and after the Exxon Valdez oil spill. Bird Study Number 9. Final Report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.
Payne, J. F., L. L. Fancey, A. D. Rahimtula, and E. L. Porter. 1987. Review and perspective on the use of mixed-function oxygenase enzymes in biological monitoring. Comp. Biochem. Physiol. 86C:233-245.
Peakall, D. B., D. Hallett, D. S. Miller, R. G. Butler, and W. B. Kinter. 1980. Effects of ingested crude oil on Black Guillemots: a combined field and laboratory study. Ambio 9: 28-30.
Peakall, D. B., D. J. Hallett, J. R. Bend, and G. L. Foureman. 1982. Toxicity of Prudhoe Bay crude oil and its aromatic fractions to nestling herring gulls. Environ. Res. 27:206-215.
Peakall, D. B., R. J. Norstrom, A. D. Rahimtula, and R. D. Butler. 1986. Characterization of mixed-function oxidase systems of the nestling herring gull and its implications for bioeffects monitoring. Envir. Tox. Chem. 5:379-385.
Perrollaz, D. C., and J. A. Rash. 1990. Analysis of sea otter fur for crude oil contamination. Symposium to evaluate the response effort on behalf of sea otters after the J/V Exxon Valdez oil spill into Prince William Sound. U.S. Fish and Wildlife Service, Biol. Rept. 90:123.
Sanger, G. A., and M. B. Cody. 1993. Survey of Pigeon Guillemot colonies in Prince William Sound, Alaska. Draft Final Report, Restoration Project 93034, U.S. Fish and Wildlife Service, Anchorage, AK.
Sowls, A. L., S. A. Hatch, and C. J. Lensink. 1978. Catalog of Alaska seabird colonies. U.S. Fish and Wildl. Serv., Biol. Serv. Prog. 78/78.
Stenson, G. B., G. A. Badgero, and H. D. Fisher. 1984. Food habits of the river otter Lutra canadensis in the marine environment of British Columbia. Can. J. Zool. 62:88-91.
Stephenson, A. B. 1977. Age determination and morphological variation of Ontario otters. Can. J. Zool. 55:1577-1583.

Testa, J. W., D. F. Holleman, R. T. Bowyer, and J. B. Faro. In press. Estimating marine river otter populations in Prince William Sound, Alaska using radiotracer implants. J. Mammal.

Walsberg, G. E. 1988. Evaluation of a nondestructive method for determining fat stores in small birds and mammals. Physiol. Zool. 61:153-159.

Woolington, J. D. 1984. Habitat use and movements of river otters at Kelp Bay, Baronof Island, Alaska. M.S. Thesis, University of Alaska Fairbanks, 147 pp.

Wren, C. D. 1984. Distribution of metals in tissues of beaver, raccoon and otter from Ontario, Canada. Sci. Total Environ. 34:177-184.

Wren, C. D. 1985. Probable cause of mercury poisoning in a wild otter, Lutra canadensis, in Northwestern Ontario. Can. Field. Nat. 99:112-114.

Wren, C. D., H. MacCrimmon, R. Frank, and P. Suda. 1980. Total and methylmercury levels in wild mammals from the precambrian shield area of South Central Ontario, Canada. Bull. Environ. Contam. Toxicol. 25:100:105.

Zenteno-Savin, T., M. A. Castellini, and L. K. Duffy. Haptoglobin concentration in plasma from Stellar sea lions at Forrester Island and the Aleutian Islands. Marine Mammal Meeting, Galveston, TX, Oct. 1993.

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Assistant Unit Leader - Wildlife, Alaska Cooperative Fish and Wildlife Research Unit and Assistant Professor of Wildlife Ecology, Institute of Arctic Biology and Department of Biology and Wildlife, University of Alaska Fairbanks, 1992-present

Assistant Professor of Zoology, Cooperative Wildlife Research Laboratory and Department of Zoology, Southern Illinois University, Carbondale, 1988-1992

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Adjunct Assistant Professor of Biology, University of Rochester, New York, 1986-1988

Doctoral dissertation research, University of Pennsylvania, Philadelphia. 1980-1985, Thesis title: Diet and reproduction in high latitude plankton-feeding seabirds.

Wildlife Biologist, Alaska Department of Fish and Game, Fairbanks, Alaska, 1979

Research Associate, Alaska Cooperative Wildlife Research Unit, University of Alaska, 1978

Visiting Research Biologist, Greenland Caribou Project, Danish Wildlife Research Institute, Kal Q, 1977

Masters thesis research, University of Alaska, Fairbanks, 1974-1976, Thesis title: Behavioral patterns of barren-ground caribou of the Central Arctic Herd adjacent to the Trans-Alaska Pipeline.

Competitive Awards and Grants:

1994-95 Equipment Grant, Multi-user Biological Equipment Program, National Science

	Foundation
1994-95	Research Grant, Coastal Marine Institute and Minerals Management Service
1993-94	Research Grant, Angus Gavin Migratory Bird Research Fund
1993-94	Research Award, President's Special Projects Fund, University of Alaska
1991-93	Research Grant, Division of Polar Programs, National Science Foundation (USA)
1989-90	Special Research Award, Office of Research Development, Administration, Southern Illinois University
1985	N.A.T.O. Post-doctoral Research Fellowship
1983-85	Shell Foundation Research Fellowship
1978	Research Grant, The Arctic Institute of North America
1977-78	Research Scholarship, Danish George C. Marshall Memorial Fund
1974-77	Research Fellowship, Alaska Cooperative Wildlife Research Unit

Selected Recent Refereed Publications:

1993 Physiological aspects of stomach oil formation in Antarctic seabirds. (with J. R. E. Taylor and A. R. Place.) Antarct. J. (U.S.) 28(5): 000-000.

1993 Factors limiting fecundity of captive Brown-headed Cowbirds. (with K.C. Holford, senior author). Condor 95: 536-545.

1992 Investigations of the adaptive role of stomach oils in seabird reproduction. (with J.R.E. Taylor and A.R. Place) Antarct. J. (U. S.) 27(5): 147-148.

1992 Effects of bird blowfly parasitism on Eastern Bluebird and Tree Swallow nestlings. (with K.L. Brink and K. Wittmann). Wilson Bull. 104: 630-643.

1992 Fecundity and egg-laying patterns of captive yearling Brown-headed Cowbirds. (with N.H. Jackson, senior author). Condor 94: 585-589.

1991 A comparison of two noninvasive techniques for measuring total body lipid in live birds. Auk 108: 509-518.

1991 Diet and postnatal energetics in two convergent taxa of plankton-feeding seabirds. Auk 108: 131-146.

1989 Relative passage rates of lipid and aqueous digesta in the formation of stomach oils. (with K.L. Brink and A.R. Place). Auk 106: 303-313.

1989 Chick feeding in the diving petrels Pelecanoides georgicus and P. urinatrix exsul. Antarctic Science 1: 337-342.

1989 [Review of] The Greenland caribou - zoogeography, taxonomy, and population dynamics, by M. Meldgaard. Meddelelser om Greenland, Bioscience 20, Copenhagen. J. Wildl. Manage. 53: 509-511.

1987 Comparative antler morphology and size of North American moose. (with W.C. Gasaway, D.J. Preston, and D.J. Reed, senior authors). Swed. Wildl. Res., Suppl. 1: 311-325.

1986 Assimilation and deposition of wax esters in planktivorous seabirds. (with A.R. Place and R.E. Ricklefs). J. Exp. Zool. 238: 29-41.

1986 Energy expenditure in adult least auklets and diving petrels during the chick-rearing period. (with R.E. Ricklefs). Physiol. Zool. 59: 661-678.

1986 Daily energy expenditure by adult Leach's storm-petrels during the nesting cycle. (with R.E. Ricklefs, senior author, and J.B. Williams). Physiol. Zool. 59: 649-660.

1986 Breeding biology of least auklets on the Pribilof Islands, Alaska. (with K.L. Brink). Condor. 88: 336-346.

1986 Decline of least auklets on the Pribilof Islands, Alaska. (with K.L. Brink). J. Field Ornith. 57: 57-59.

1986 Assimilation and deposition of dietary fatty alcohols in Leach's storm-petrel, Oceanodroma

leucorhoa. (with A.R. Place, senior author). J. Exp. Zool. 240: 149-161

1986 Notes on petrels (Procellariiformes) breeding on Ardley Island, South Shetland Islands (with M. Sallaberry A. and K.L. Brink). Ser. Cient. INACH 34: 67-72.

1985 Behaviour of west Greenland caribou during a population decline. (with H. Thing). Holarct. Ecology 8: 77-87.

1984 History, status, and taxonomic identity of caribou (Rangifer tarandus) in northwest Greenland. (with H. Thing and K.L. Brink). Arctic 37: 23-30.

1984 Observations on the cooling tolerance of the embryos of the diving petrel Pelecanoides georgicus. (with R.E. Ricklefs). Auk 101: 160-161.

1983 Some aspects of the breeding biology of the diving petrels Pelecanoides georgicus and P. urinatrix exsul at Bird Island, South Georgia. (with R.E. Ricklefs). Br. Antarct. Surv. Bull. No. 58: 29-38.

1983 Development of homeothermy in the diving petrels Pelecanoides urinatrix exsul and P. georgicus and the antarctic prion Pachyptila desolata. (with R.E. Ricklefs, senior author). Comp. Biochem. Physiol. 75: 307-311

1983 The size, organic composition, and energy content of Leach's storm-petrel eggs with regard to position in the precocial/altricial spectrum. (with W.A. Montevecchi, I. Kirkham, senior authors, and K.L. Brink). Can. J. Zool. 61: 1456-1463.

Professional Organizations and Service:

Member - American Association for the Advancement of Science
Member - American Ornithologists' Union
Member - Cooper Ornithological Society
Member - The Wildlife Society
Appointed Delegate - from the American Ornithologists' Union to the International Council for Bird Preservation (ICBP), U.S. Section
Peer Reviewer - Restoration Science, Oil Spill Restoration Work Group, Alaska Department of Fish and Game and U.S. Environmental Protection Agency
Regular Reviewer of Manuscripts - Auk, Condor, Journal of Wildlife Management, Animal Behaviour, Arctic
Co-convenor - Symposium on Avian Energetics and Nutritional Ecology, 111th Annual Meeting of the American Ornithologists' Union, 1993.
Member - Committee on Local Arrangements, 111th Annual Meeting of the American Ornithologists' Union, Fairbanks, AK.

Certifications:

Certified Wildlife Biologist - The Wildlife Society

CURRICULUM VITAE

R. Terry Bowyer

Education: Ph.D., 1985, The University of Michigan, Natural Resources
M.S., 1976, Humboldt State University, Wildlife Management
B.S., 1970, Humboldt State Univ., Wildlife Management, Biology Minor

Experience:

Professor of Wildlife Ecology, University of Alaska Fairbanks, 1994-present.
Tenured Associate Professor of Wildlife Ecology, University of Alaska Fairbanks, 1988-present
Assistant Professor of Wildlife Ecology, University of Alaska Fairbanks, 1986-1988
Assistant Professor of Wildlife Science, Unity College in Maine, 1980-1986
Visiting Assistant Professor of Biology, Mountain Lake Biological Station, University of Virginia, 1985
California State Park Ranger (P.I.),1968-1974

Other Activities:

Associate Editor, Journal of Mammalogy, 1991-present
Editor, Muskox Husbandry by P. Groves. Alaska Biological papers, 1991
Associate Editor, The Wildlife Society Bulletin, 1988-1989
Associate Editor, Desert Bighorn Council Transactions,1987-1988
President:
Alaska Chapter of the Wildlife Society (1989-1990);
Maine Chapter of the Wildlife Society (1983-1984); and
Ann Arbor Chapter of the Wildlife Society (1977-1978).

Selected Publications On Carnivores (46 Total Publications):

Testa, J.W., D.F. Holleman, R.T. Bowyer, and J.B. Faro. In press. Estimating marine river otter populations in Prince William Sound, Alaska using radiotracer implants. J. Mammal.

Bowyer, R.T., J.W. Testa, J.B. Faro, C.C. Schwartz and J.B. Browning. In press. Changes in diets of river otters in Prince William Sound, Alaska: effects of the Exxon Valdez oil spill. Can. J. Zool.

Duffy, L.K., R.T. Bowyer, J.W. Testa and J.B. Faro. In press. Chronic effects of the Exxon Valdez oil spill on blood and enzyme chemistry of river otters. Environ. Toxicol. Chem.

Dale, B.W., L.G. Adams, and R.T. Bowyer. In press. Winter wolf predation in a multiple ungulate prey system, Gates of the Arctic National Park, Alaska. Can. J. Zool.

Duffy, L.K., R.T. Bowyer, J.W. Testa, and J.B. Faro. 1993. Differences in blood haptoglobin and length-mass relationships in river otters (Lutra canadensis) from oiled and nonoiled areas of Prince William Sound, Alaska. J. Wildl. Dis. 92:353-369.

Bowyer, R.T. 1987. Coyote group size relative to predation on mule deer. Mammalia 51:515-526.

Docktor, C.M., R.T. Bowyer, and A.G. Clark. 1987. Number of corpora lutea as related to river otter age and distribution in Maine. J. Mammal. 68:182-185.

Jenks, J.A., A.G. Clark and R.T. Bowyer. 1986. Sex and age determination for fisher using radiographs of canine teeth: a response. J. Wildl. Manage. 50:277-278.

Shea, M.E., N.L. Rollins, R.T. Bowyer, and A. Clark. 1985. Fisher corpora lutea as related to

age and distribution in Maine. J. Wildl. Manage. 49:37-40.
Jenks, J.A., R.T. Bowyer and A.G. Clark. 1984. Sex and age class determination for fisher using radiographs of canine teeth. J. Wild. Mange. 48:626-628.

Graduate Student Supervision:
1991 - Present (Chair of Committee)
Graduated: 2 Ph.D., 4 M.S. students
Current: 5 Ph.D., 4 M.S. students
1989 - Present (Committee Member)
Graduated: 2 Ph.D., 9 M.S. students
Current: 7 Ph.D., 8 M.S. students

Selected Grants:
1992 - Spatial Organization and Feeding Ecology of the Alexander Archipelago Wolf. Alaska Dept. Fish and Game, $75,000.
1989-1991 - Effects of the Exxon Valdez Oil Spill on River Otters in Prince William Sound. Wildlife Assessment Program, $180,000.

Biographical Sketch:
Dr. Lawrence K. Duffy
Professor of Chemistry and Biochemistry

Birthday: 1 February 1948

Education:
Fordham University, Bronx, NY. B.S., 1969, Chemistry
University of Alaska Fairbanks, Fairbanks, AK, M.S., 1971, Organic Chemistry
University of Alaska Fairbanks, Fairbanks, AK, Ph.D., 1977, Biochemistry

Professional Experience:

1971-73	Lieutenant, U.S. Navy
1977-78	Postdoctoral Fellow, Boston University, with Dr. R. A. Laursen. Research: Structure of EF-TU
1978-80	Postdoctoral Fellow, Department of Physiological Chemistry, Roche Institute of Molecular Biology, Nutley, NJ, with Dr. C. Y. Lai
1980-81	James W. McLaughlin Fellow, Department of Human Biological Chemistry and Genetics, University of Texas Medical Branch, Galveston
1981-82	Research Assistant Professor, Department of Human Biological Chemistry and Genetics, University of Texas Medical Branch, Galveston
1983-87	Assistant Professor of Biochemistry/Neurology, Harvard Medical School, Boston
1987-91	Associate Professor of Chemistry and Biochemistry and Coordinator, Program in Biochemistry and Molecular Biology, University of Alaska Fairbanks, Fairbanks, AK
1991-present	Professor of Chemistry and Biochemistry, Univ, of Alaska Fairbanks, Fairbanks, AK

Honors and Awards:
ACS Analytical Chemistry Award, Fordham University, 1969
NSF Summer Traineeship, Department of Chemistry, University of Alaska Fairbanks, 1971
J. W. McLaughlin Fellow, University of Texas Medical Branch, Galveston, 1980-81

W. F. Milton Scholar, Harvard University, 1983
Alzheimer Disease and Related Disorders' Association Faculty Scholar Award, 1987
Vice-President Board of Directors, Alzheimer's Disease Association of Alaska, 1993.
UAF's Carol Fiest Undergraduate Advising Award, 1993-94.

Bibliography:

Segal, A. and Duffy, L. K. 1992. Ethanol elimination among different racial groups. Alcohol: Clinical and Exp. Res. 9:213-217.

Borgese, T. A., Harrington, J. P., Duffy, L. K. and Bourke, S. 1992. Function studies on goosefish hemoglobin. Comp. Biochem. Physiol. 101B:535-539.

Zhao, X., Valantas, J.A., Vyas, S. and Duffy, L. K. 1993. Comparative toxicity of amyloid ??-peptides in neuroblastoma cell lines: Effects of albumin and physalaemin. Comp. Biochem. Physiol. 106C:165-170.

Zhao, X., Schoenheit, C. and Duffy, L. K. 1991. A Heparin-Binding protein from veuroblastoma cells: Immunological comparison to ?? amyloid precursor protein, Comp. Biochem. Physiol. 100A(3):715-718.

Kowall, N.W., Beal, M.F., Busciglio, J., Duffy, L.K. and Yankner, B.A. 1991. An in vivo model for the neuro-degenerative effects of ?? amyloid and protection by substance P. Proc. Natl. Acad. Sci (USA) 88:7247-7251.

Duffy, L. K. and Segal, B. 1991. Haptoglobin levels among alcoholics in Alaska. Arct. Med. Res., 50:166-169.

Zhao, X. and Duffy, L.K. 1991. On the interaction of a synthetic amyloid ??-peptide with NB41A3 cells. Neurosci. Res. Comm. 9:159-166.

Duffy, L.K., Bowyer, R.T., Testa, J.W. and Faro, J.B. 1993. Chronic effects of the Exxon Valdez oil spill on blood and enzyme chemistry of river otters. Environ. Toxicol. Chem. 13:643-647.

Duffy, L.K., Testa J. W., Bowyer, R. T. and Faro, J. B. 1993. Differences in blood haptoglobin and length-mass relationships in river otter (Luttra canadensis) from oiled and nonoiled areas of PWS. J. Wildlife Dis. 29:353-359.

Levine, M.E., Milliron, A.N. and Duffy, L.K. 1994. Dirunal and seasonal rhythms of melatonin, cortisol and testosterone in interior Alaska. Arct. Med. Res. 53:25-34.

Avksentyuk, A.V., Kurilovich, S.A., Duffy, L.K., Segal B., Voevoda, M.I. and Nikitin, Y.P. Alcohol consumption and flushing response in Chukotka. Journal of Studies on Alcohol, In press.

Duffy, L.K. 1993. Oxyfuel in Alaska: Use of interleukins to monitor effects on the immune system. Sci Total. Environ., In press.

Duffy, L.K., Bowyer, R.T., Testa, F.W. and Faro, J.B. 1994. Evidence for recovery of body mass and haptoglobin values of river otters following the Exxon Valdez oil spill. J. Wildlife Dis., In press.

Danilenko, K.V., Putilov, A.A., Russkikh, G.S., Duffy, L.K., Barnes, B.M. and Ebbesson, S.O.E. 1994. Diurnal and seasonal variations of melatonin and serotonin in women with seasonal affective disorder. Arct. Med. Res., In press.

Yankner. B.A., Caceres, A. and Duffy, Lawrence K. 1990. Nerve growth factor potentiates amyloid toxicity, Proc. Natl. Acad. Sci. USA, 87:9020-9023.

Segal, B., Duffy, L.K., Kurilovitch, Sa.A., & Avksentyuk, A.V. May, 1990. Alaskan and Siberian studies on alcoholic begavior and genetic predisposition. Paper presented at the 8th International Congress on Circumpolar Health, Whitehorse, Yukon, Canada.

Yankner, B.A., Duffy, L.K., and Kirschner, D.A. 1990. Neurotrophic and neurotoxic effects of

beta-amyloid: Reversal by tachykinin neuropeptides, Science 250:279-282.

Kirschner, D.A., Duffy, L.K., Fraser, P.E., O'Malley, J.D., Nguyen, J. and Inouye, H. 1990. Morphology and antibody recognition of synthetic beta-amyloid peptides.

Selkoe, D.J., Duffy, L.K., Nukina, N., Podlisny, M.B., Abraham, C. and Kosik, K.S. 1989. Molecular pathology of intra and extraneuronal filaments in brain aging and Alzheimer's disease. In Familial Alzheimer's Disease (Miner, G.D., Richter, R.W., Blass, J.P. and Winters-Miner, L.A., Eds.) Marcel Dekker, Inc., NY, pp. 137-151.

Joachim, L.L., Duffy, L.K., Morris, J.H., and Selkoe, D.J. 1988. Protein chemical and immunocytochemical studies of meningovascular beta-amyloid in Alzheimer's disease and normal aging. Brain Res. 474:100-111.

Kosik, K.S., Orecchio, L.D., Bakalis, S., Duffy, L.K., and Neve, R.L. 1988. MAP2: The microtubile-binding domain, potential phosphoRylation sites and Alzheimer neurofibillary tangle epitope, J. Neurochem. 51:587-598.

Chapman, H.A., Ehrhardt, M.M., Grombie, G., and Duffy, L.K. 1988. Assay of extracellular matrix elastin degradation based on cation exchange HPLC determined release of tritiated desmosine and isodesmosine, J. Biochem. Biophys. Meth. 15:283-290.

Roth, M.M., Drovin, G.L., and Duffy, L.K. 1987. Isolation of human ferrochelai. Arch. Dermat. 123:429-430.

Kirschner, D.A., Inouye, H., Duffy, L.K., Sinclari, A., Lind, M., and Selkoe, D.J. 1987. Synthetic beta-peptide of Alzheimer disease forms amyloid-like fibrils in vitro. Proc. Nat. Acad. Sci. 84:6953-6957.

Selkoe, D.J., Duffy, L.K., Nukina, N., Joachim, C.L. Podlisny, M.B., and Kosik, K.S. (1987). Biochemical analysis of mayloid filaments and paired helical filaments and thier respective contributions to neuronal degeneration. In Banbury Reports 27: Molecular Neuropathology of Aging, pp. 235-252.

Duffy, L.K., Kirschner, D.A., Joachim, C.L., Sinclair, A., Inouye, H., and Selkoe, D.J. 1987. Comparison of amyloid from AD with synthetic paptide in peptides, Chemistry and Biology, (Marshall, G.R. ed.) Escom Science Pub. Netherlands, pp. 604-607.

Duffy, L.K., Rassol, C.G., Walsh, R.L., Podlisny, M.B., and Selkoe, D.J. 1987. Studies on the relationship between plasma proteins and amyloid fibers found in Alzheimer's disease. Ann. N.Y. Acad. Sci., 529:233-235.

Project Title Food limitation on recovery of injured resources: an ecosystem approach to the restoration of marine birds; distribution and abundance of forage fish as indicated by puffin diet sampling

Project # 95019 Revised 8/3/94

Proposed By Scott A. Hatch

Lead Trustee Agency National Biological Survey

Cost FY 95 $267.7K

Cost FY 96 $214.7K

Cost FY 97 $214.7K

Cost Total Unknown (Budget for each fiscal year includes the cost of data analysis and write-up of work conducted in the preceding year.)

Duration 3 years (Completion date: 3/98. Useful results can be obtained in 1 year. A 3-year project is recommended to assess interannual variation in composition of forage fish stocks.)

Geographic Area
Naked Island
Smith Island
Porpoise Rocks
Wooded Islands
Chiswell Islands
Barren Islands

Injured Resource Forage Fish

Contact Person
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B. INTRODUCTION

Tufted puffins are widely distributed in breeding colonies throughout the Exxon Valdez oil spill area. During the chick-rearing period, adults make several trips daily to the nesting burrow, carrying fresh prey to their young. By intercepting those food deliveries, it is possible to sample the nestling diet of puffins systematically and nonconsumptively. Puffins are representative of seabirds (common murres, marbled murrelets, pigeon guillemots, black-legged kittiwakes and others) that rely in summer on a common food base consisting of forage species like capelin, sandlance and smelts, and the juveniles of commercially important species such as pollock, herring, and salmon.

This project will use puffin diet sampling as a means to quantify seasonal, annual, and geographic variation in the composition of the forage fish community at selected stations within the spill area. The project will complement traditional, more costly approaches involving hydroacoustics and net sampling and will also provide a reliable source of seabird prey specimens for laboratory analaysis.

C. NEED FOR THE PROJECT

Three species of marine birds (common murre, marbled murrelet, and pigeon guillemot) and one pinniped (harbor seal) were injured by the Exxon Valdez oil spill and are not recovering. An additional species (black-legged kittiwake) showed early effects on reproduction (comparing oiled and unoiled areas) and has experienced widespread breeding failure throughout Prince William Sound in the last two years. The summer diets of these and other members of the pelagic community of vertebrate predators (birds, mammals, and fish) are known to overlap. One hypothesis to explain the failure of recovery of injured species is that adverse changes are occurring in the quantity or quality of these species' prey. To test that hypothesis, it is necessary to quantify the status and trends of prey populations, particularly the forage fish that comprise an important part of the summer diet. Few data are available on the distribution and abundance of forage fish, because most species are not commercially harvested, and traditional methods of fishery science tend to be difficult and expensive. In the Gulf of Alaska, tufted puffins have proved to be excellent samplers of the forage fish community, providing annual indices of the distribution and relative abundances of keystone species such as capelin, sandlance, pollock, myctophids, and squids. Conducted over a span of years, this approach offers a cost-effective means of monitoring key components of the pelagic ecosystem and testing the hypothesis that recovery of marine birds and mammals is influenced by changes in the composition of marine fish stocks.

Seabirds in general, and puffins in particular, may constitute an important mortality factor on the early life stages of commercially important species. In the Gulf of Alaska, Hatch and Sanger (1992) calculated that tufted puffins took 11 billion pollock from mid July to mid September, roughly one-tenth of the first-year juveniles available just prior to chick-rearing and ten times the number of fish surviving to the following March. On the Barren Islands in 1993, puffins frequently delivered juvenile sockeye salmon, although the smolt were too large to be readily ingested by the chicks, and many went to waste (A. Kettle, pers. comm.).

Whether seabird predation proves to be a significant source of mortality or not, previous results suggest that diet sampling can provide an early indication of year-class strength in some species. For instance, the proportion of pollock in tufted puffin diets at the Semidi Islands (western Gulf of Alaska) was strongly correlated over three years with independent measures of year-class strength obtained in fishery investigations (Hatch and Sanger 1992). A similar outcome might be obtained for sockeye salmon at the Barren Islands or pink salmon in Hinchinbrook Entrance to Prince William Sound, where an out-migration of juveniles in late summer and fall (PWS Fisheries Research Planning Group, 1993) would encounter the sizeable puffin colonies on Porpoise Rocks and the Wooded Islands.

Because puffins deliver whole, undamaged prey to their chicks, this project can serve as a ready source of specimens for determination of prey quality (composition and energy density), population structure (age-sex ratios, genetic stock identification), and trophic studies (fish stomach contents, stable isotope ratios and/or lipid analysis). Puffin samples have also been used to estimate daily growth increments of juvenile sandlance and pollock (Hatch 1984, Hatch and Sanger 1992).

D. PROJECT DESIGN -- Objectives, Methods, Schedule and Location

1. Objectives

- Annually assess the species composition of the forage fish community near selected colonies of seabirds in the northern portion of the Exxon Valdez oil spill area.
- Cross check the species composition of forage fish as determined by puffin diet sampling and hydroacoustic/net sampling techniques.
- Assess the timing and magnitude of puffin predation on commercially important prey species including Pacific herring, pink salmon, and sockeye salmon.
- Furnish whole prey specimens on demand for complementary studies of prey energetics, food web relationships, and fish population characteristics.

2. Methods

Puffin diet samples are collected most efficiently by placing wire screens over the entrances to burrows. Unable to enter, returning adults frequently drop their food loads on or near the screens, which are removed when the samples are retrieved after 1-3 h. Samples are washed, bagged and preserved for later analysis in the laboratory. Any temporal sampling design that may be desired can be implemented, but for maximizing the quantity of food obtained, morning hours tend to be most productive because puffins generally make a food delivery soon after first daylight.

One issue raised by this sampling approach is whether puffins take different types of prey in proportion to their relative abundances in the water column. Therefore, a desirable element of the field work during the first year of this project would be a comparison of the results from puffin diet sampling with simultaneous deployment of hydroacoustics and net sampling offshore at one or more colonies. The offshore work is not budgeted for in this proposal, but it is anticipated that the coordinated study would be achieved through cooperation with other projects (forage fish assessment or SEA plan) proposed for fiscal year 1995.

Puffin productivity (chicks per burrow surviving at a late stage of the breeding season) and breeding chronology (estimated from chick wing lengths) will be monitored at little or no additional cost in each of the study colonies.

3. Schedule

Fiscal Year 1995

Nov-June	Establish contracts, recruit personnel, safety training, boat and collection equipment preparation.
July-Aug	Field collection of puffin diet samples at six sites in Prince William Sound and northern Gulf of Alaska; coordinated investigation of sampling methods at Porpoise Rocks.
Sept	Laboratory analysis of food samples.

Fiscal Year 1996

Oct-Dec	Complete laboratory analysis; data analysis and report writing.
Jan	Draft annual report.
March	Final annual report.

4. Technical Support

Prey samples may be identified and measured under contract to the University of Alaska or a private consultant.

5. Location

The Porpoise Rocks colony in Hinchinbrook Entrance is strategically located relative to juvenile salmon migration. It is probably also the best location for a comparative study of sampling techniques. Additional colonies in Prince Willaim Sound would include Naked Island, Smith Island, and the Wooded Islands. Outside the Sound, but in the path of the oil spill, colonies of first choice include the Chiswell Islands and Barren Islands. There is some question whether puffin habitat on the Chiswells is sufficiently accessible; if not, at least one alternative site would be worked along the Kenai Peninsula or in the Kodiak Island area.

E. PROJECT IMPLEMENTATION

This project will be implemented by the Alaska Science Center, National Biological Survey. Center personnel developed the field techniques proposed for puffin diet sampling and have successfully applied the methods at more than 20 puffin colonies in the Gulf of Alaska since 1985.

F. COORDINATION

As previously noted, coordination with offshore operations that sample forage fish by traditional methods is a highly recommended component of this project. The project will contribute to and draw upon SEA investigations of juvenile salmon and herring, and will use information on physical oceanography generated by other EVOS funded studies in the interpretation of seasonal, annual, and geographic variation in forage fish communities.

G. PUBLIC PROCESS

The concept of using puffins as fish samplers was introduced and discussed with members of the public at both the April 1994 EVOS restoration planning workshop and at a follow-up meeting (Anchorage, 9 May 1994) of public and government representatives interested in forage fish research. A representative of the Kodiak Groundfish Databank, in particular, has expressed interest in the prospects of this study to provide information relevant to the management of pollock and other fisheries.

H. PERSONNEL QUALIFICATIONS

Dr. Scott A. Hatch, Principal Investigator, is employed as a Supervisory Research Biologist in the Alaska Science Center, National Biological Survey. Dr. Hatch has conducted research on the population dynamics and feeding ecology of seabirds in Alaska since 1975. He has authored more than 30 published papers on those topics and has managed interagency programs for seabird research and monitoring since 1987. Curriculum vitae are filed and available on request from the Restoration Office, Exxon Valdez Oil Spill Trustee Council.

I. BUDGET

FY 95	NBS
Personnel	149,000
Travel	15,000
Contractual services	20,000
Commodities	10,000
Equipment	45,000
Capital outlay	0
Subtotal	239,000
General administration	45,400
NEPA compliance	0
Total	284,400

J. LITERATURE CITED

Hatch, S.A. 1984. Nestling diet and feeding rates of rhinoceros auklets in Alaska. Pp. 106-115 in D.N. Nettleship, G.A. Sanger, and P.F. Springer, eds. Marine birds: their feeding ecology and commercial fisheries relationships. Can. Wildl. Serv. Spec. Pub., Ottawa.

Hatch, S.A., and G.A. Sanger. 1992. Puffins as samplers of juvenile pollock and other forage fish in the Gulf of Alaska. Mar. Ecol. Prog. Ser. 80:1-14.

PWS Fisheries Research Planning Group. 1993. Sound ecosystem assessment: initial science plan and monitoring program. Rep. No. 1, Cordova, AK.

Project Title Food limitation on recovery of injured resources: an ecosystem approach to the restoration of marine birds; seasonal movements and pelagic habitat use by common murres from the Barren Islands

Project # 95021 Revised 8/3/94

Proposed By Scott A. Hatch

Lead Trustee Agency National Biological Survey

Cost FY 95 $230,900

Cost FY 96 $221,100

Cost Total Unknown (Budget for each fiscal year includes the cost of data analysis and write-up of work conducted in the preceding year.)

Duration 2 years (Completion date: 3/97. Useful results can be obtained in 1 year. A 2-year project is recommended to assess interannual variation in the foraging behavior of common murres.)

Geographic Area Barren Islands

Injured Resource Common Murres

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B. INTRODUCTION

Small (30 g) satellite transmitters have recently become available for use in wildlife telemetry. These implantable devices are proven effective when deployed on birds in the size range of common murres, i.e., about 1 kg. In this project, satellite transmitters will be surgically implanted in a sample of murres from the Barren Islands to determine both the summer feeding areas and wintering areas of birds from this heavily impacted colony. This information will be vital for designing and optimizing an investigation of food availability to murres and for testing the hypothesis that food limitation is constraining the recovery of the Barren Islands population following the Exxon Valdez oil spill.

As diving birds, murres do not access the entire water column uniformly, but concentrate their foraging activity in depth ranges dictated by the distribution of their preferred foods and limitations imposed by their own diving physiology. This additional information is needed to address the question of food limitation on murre productivity and recovery. Externally mounted depth recorders

will be used to determine the average time-at-depth for common murres foraging in the vicinity of the Barren Islands.

C. NEED FOR THE PROJECT

Common murres were among the vertebrate species most seriously injured by the Exxon Valdez oil spill. About 75% of the 35,000 bird carcasses recovered during and shortly after the event were murres, and estimates of murre losses were in excess of 100,000 individuals. After the oil spill, fewer breeding murres were found at the Barren Islands compared to historical data, and annual censuses have not detected any recovery in numbers. Also, based on data from Nord Island, production of chicks was almost zero in both 1989 and 1990, and still low in 1991 and 1992 compared to colonies outside the spill zone.

One hypothesis to explain the failure of recovery in common murres is that food availability is limiting the ability of birds to breed successfully or to survive in sufficient numbers during the nonbreeding season. An evaluation of that hypothesis requires that we identify the principal feeding areas of murres in both seasons and design appropriate oceanographic studies to assess the factors affecting food availability. Telemetry offers a more cost-effective approach for determining foraging patterns and habitat use than is possible using traditional survey methods.

In many populations of seabirds, the majority of natural mortality occurs during the winter months (Hatch 1987, Hatch et al. 1993). Problems with the food supply on the wintering grounds may constrain the recovery of Barren Islands murres even if productivity improves. Probably there is another critical period in fall, when recently fledged young make the transition to self-feeding (Burger 1980). However, the existence or location of possible "nursery areas" is all but unknown for this and other populations of seabirds.

Through the combined use of satellite transmitters and time-depth recorders, this project will provide a three-dimensional view of murre foraging patterns around the Barren Islands in summer. Additionally, transmitters deployed in fall and tracked through the winter months will reveal the primary wintering areas used by this population. It may also be possible to locate key foraging areas of juvenile murres by deploying transmitters on breeding males late in the season. Flightless murre chicks are led to sea by their male parents, who continue to provide parental care for several weeks as the young learn gradually to feed themselves.

D. PROJECT DESIGN -- Objectives, Methods, Schedule, and Location

1. Objectives

- Determine the foraging range and primary feeding areas of common murres from the Barren Islands, including assessment of individual and temporal variation.
- Locate important nursery and/or wintering areas of common murres from the Barren Islands and determine the timing of use of those critical habitats.
- Obtain average time-at-depth profiles for a sample of foraging murres from the Barren Islands.

2. Methods

Murres will be captured with poles and nooses during incubation and chick-rearing periods in the Lighthouse Rock portion of the colony on East Amatuli Island. Transmitters will be surgically implanted by a qualified veterinarian. The ARGOS Data Collection and Location System will be used to track the movements of instrumented birds. Transmitters will be programmed to emit signals on one of two duty cycles: (1) continuous transmission, providing frequent information on locations (accurate to $\leq$ 1 km) over a 3-week period (expected battery life), or (2) low-interval transmissions (e.g., 6 h every 3 days) for less frequent position data over the course of an annual cycle (52 weeks). Position data will be mapped using CAMRIS (Computer Aided Mapping and Resource Information System) or other suitable GIS software.

Time-depth recorders are relatively inexpensive devices employing hypodermic syringes and photographic film to record the depth-dependent position of an light-emitting diode (Wilson et al. 1989). The instruments are attached externally to the dorsal feathers and must be retrieved after an appropriate interval to obtain the data on diving depths. Information on the depth and duration of dives is cumulatively recorded on the film, and the exposed film is analyzed using a densitometer. Each unit is calibrated prior to deployment. LED depth recorders have been used successfully with thick-billed murres in the Canadian Arctic (Croll et al. 1992) and on smaller alcid species in the North Pacific (Burger 1991).

Special note on feasibility--A pilot study on the use of satellite transmitters in common murres was initiated in July 1994. Transmitters were implanted in two adult murres captured on Middleton Island, north-central Gulf of Alaska, on 16 July. this species appears to tolerate the necessary anesthesia and surgical procedures well. The implants constituted about 3% of body mass in each instance. Both birds were released in apparently healthy condition within 2 hours after surgery and began transmitting location data immediately. One transmitter is programmed to transmit on a continuous cycle of 8 hours on and 8 hours off; the other will transmit for 6 hours every 4 days over several months. Twelve days after surgery (28 July), both birds were alive and well (the devices include a body temperature sensor) and location data were accumulating at rates of up to 5 locations in a 6-hour period. The accuracy of location data obtained thus far is comparable to previous animal tracking studies employing satellite transmitters and ARGOS data processing, i.e., potential errors are generally $>$1000 m, and frequently unknown. The objectives of this project would appear to be attainable by increasing the number of transmitters deployed and by using appropriate statistical algorithms to identify concentrated use areas in both summer and winter.

3. Schedule

Fiscal Year 1995

Nov-June	Establish contracts, recruit personnel, procure satellite transmitters and LED depth recorders.
July-Aug	Field operations at East Amatuli Island, begin data acquisition via ARGOS.
Sept	Continue ARGOS data acquistion, densitometer readings and interpretation of LED depth recorder films.

Fiscal Year 1996

Oct-Dec	Continue ARGOS data acquisition, data analysis and report preparation.

Jan Draft annual report.

March Final annual report.

4. Technical Support

The manufacture, calibration, and optical density measurements of LED depth recorders will be contracted to a qualified specialist. This project also requires the services of an experienced veterinarian and access to the ARGOS data-logging and distribution system, both of which are available in the Alaska Science Center of the National Biological Survey.

5. Location

These studies will be carried out in the colony at the north end of East Amatuli Island, the more accessible of two colonies of common murres in the Barren Islands.

E. PROJECT IMPLEMENTATION

The project will be implemented by the Alaska Science Center, National Biological Survey. In addition to the in-house technical support mentioned above, Center personnel have unique experience with implantable satellite transmitters for recording the movements of birds at sea (Petersen et al., MS). The Principal Investigator for this project is conducting a pilot study of transmitter implants and satellite tracking of common murres in the Gulf of Alaska during 1994 (see Methods).

F. COORDINATION

Work on East Amatuli Island will be coordinated with the monitoring study of common murres proposed for that site to facilitate the telemetry study and avoid any conflicts between the two. Results of this study should be used in planning future investigations of the food limitation hypothesis as it pertains to common murres.

G. PUBLIC PROCESS

The idea of using satellite transmitters to identify the foraging areas of common murres was introduced at a meeting of public and government representatives interested in forage fish research (Anchorage, 9 May 1994). Should this project be funded, further opportunities for public input will be available at two winter workshops planned for 1994-95 by the Exxon Valdez Oil Spill Restoration Office.

H. PERSONNEL QUALIFICATIONS

Dr. Scott A. Hatch, Principal Investigator, is employed as a Supervisory Research Biologist in the Alaska Science Center, National Biological Survey. Dr. Hatch has conducted research on the population dynamics and feeding ecology of seabirds in Alaska since 1975. He has authored more than 30 published papers on those topics and has managed interagency programs for seabird research and monitoring since 1987. Curriculum vitae are filed and available on request from the Restoration Office, Exxon Valdez Oil Spill Trustee Council.

Dr. Alan E. Burger, collaborator for the study of diving behavior, is an Assistant Professor of Biology at the University of Victoria in British Columbia. His research specialty is the foraging patterns and diving physiology of penguins and alcids, on which he has published widely in the ornithological literature. Dr. Burger was involved in original development of LED depth recorders and has used the devices extensively in recent research on the diving characteristics of alcids.

I. BUDGET

FY 95	NBS
Personnel	107,000
Travel	10,000
Contractual services	10,000
Commodities	30,000
Equipment	54,000
Capital outlay	0
Subtotal	211,000
General administration	40,100
NEPA compliance	0
Total	251,100

J. LITERATURE CITED

Burger, A.E. 1991. Maximum diving depths and underwater foraging in alcids and penguins. Pages 9-15 in W.A. Montevecchi and A.J. Gaston, eds. Studies of high-latitude seabirds. 1. Behavioural, energetic, and oceanographic aspects of seabird feeding ecology. Can. Wildl. Serv. Occ. Pap. 68, Ottawa.

Burger, J. 1980. The transition to independence and postfledging parental care in seabirds. Pages 367-347 in J. Burger, B.L. Olla, and H.E. Winn, eds. Behavior of marine animals. Vol. 4: marine birds. Plenum Press, New York.

Croll, D.A., A.J. Gaston, A.E. Burger, and D. Konnoff. 1992. Foraging behavior and physiological adaptation for diving in thick-billed murres. Ecology 73: 344-356.

Hatch, S.A. 1987. Adult survival and productivity of northern fulmars in Alaska. Condor 89: 685-696.

Hatch, S.A., B.D. Roberts, and B.S. Fadely. 1993. Adult survival of black-legged kittiwakes (Rissa tridactyla) in a Pacific colony. Ibis 135: 247-254.

Petersen, M.R., D.C. Douglas, and D.M. Mulcahy. MS. Use of implanted satellite transmitters to locate spectacled eiders at sea. National Biological Survey, Alaska Science Center, Anchorage, AK.

Wilson, R.P., A.E. Burger, B.L.H. Wilson, M.-P.T. Wilson, and C. Noldeke. 1989. An inexpensive depth gauge for marine animals. Mar. Biol. 103: 275-283.

Project Title Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound (NVP). Management Overview Plan.

Project # 95025 Revised 8/3/94
Component Projects; 95025A, 95025B, 95025C, 95075, 95025G, 95094, 95087, 95025H

Proposed By Leslie Holland-Bartels

Lead Agency National Biological Survey

Cost FY 95 $65,000

Cost FY 96 $70,000 (plus $1,378,000 under component projects)

Duration 5 Years (start-up April 1995)

Geographic Area Prince William Sound

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B. INTRODUCTION

The nearshore ecosystem is (1) constrained by bathymetry to relatively shallow water where space is limiting, (2) receives a large proportion of primary production from sessile macroalgae, and (3) is composed largely of sessile benthic invertebrates that provide the predominant prey for a variety of vertebrate predators whose distributions are limited to the nearshore ecosystem. Because of shorelines and coastal physiography, the nearshore ecosystem served as a repository for much of the oil spilled by the T/V Exxon Valdez. As a result most of the observed injured resources may be considered components of the nearshore system. Injured wildlife resources include several warm blooded vertebrate predators that reside in the nearshore ecosystem. Non-recovering nearshore vertebrate species include sea otters, harlequin ducks, pigeon guillemots while the status of white-wing scoters, goldeneye and river otters is not known.

Recovery of injured resources is usually defined relative to pre-spill distribution and abundance; however, such data are most often lacking or incomplete. We propose to assess the recovery process of injured vertebrate predators through two alternative means. Each of the proposed methods and associated hypotheses are presented below.

1. Invertebrate Prey Populations as Indicators of Predator Density

Although many factors may affect the structure of nearshore invertebrate populations (eg. physical processes, disease, recruitment...), the effects of sea otter predation on their preferred prey (urchins,

clams and mussels) are will documented. In areas where sea otter predation is limited, invertebrate prey populations typically respond by increased density and increase in the mean and maximum size of individuals. Mortality of injured resources (including sea otters) was higher in certain areas of the spill than in others and resulted in reduced densities of nearshore vertebrate predators. Differences in densities of predators still vary among areas within and outside the spill zone. As a result of the oil-related reduction of predator densities, we predict that prey populations may respond by increased survival resulting in changes in the size class distribution of invertebrate prey populations and possibly increases in recruitment. Comparisons of prey distributions may provide a measure of the state of recovery of vertebrate predators in areas where mortality was known to be nearly complete. If prey populations are significantly different in abundance or size, it may be concluded that predation forces are not similar among areas of different predator densities, possibly as a result of a persistent oil effect and suggesting a lack of recovery. Conversely, if prey populations are similar among areas which varied relative to oil exposure, it may be assumed that predation is similar among those areas, densities of vertebrate predators are limited by prey and that recovery may be underway. We identified 3 principal prey species of sea otters and sea ducks with which to evaluate the predator/prey hypothesis: clams, mussels and urchins.

> $H_0$1: Prey populations in areas where vertebrate predator densities were reduced by oil exposure do not differ from areas where predator populations were not reduced.

The size structure and a measure of abundance of clam, mussel and urchin populations will be estimated in low density (oiled) and high density (non-oiled) portions of western PWS, to evaluate this hypothesis.

2. Bioindicators of Nearshore Ecosystem Health

For many wildlife resources injured by the spill, direct restoration activities are not possible. Because differences in abundance estimates between oiled and non-oiled are often limited by pre-spill data, direct determinations of recovery status are difficult. We propose to evaluate the recovery status of injured vertebrate predator populations by comparing measures of fitness among individuals and populations in oiled and non-oiled areas of PWS.

> $H_0$2: Measures of individual fitness do not differ among populations occurring in oiled and non-oiled areas of PWS

Age and sex specific measures (where necessary) of individual fitness, including morphometrics, blood chemistry and immune function will be obtained.

> $H_0$3: Measures of population fitness do not differ among populations occurring in oiled and non-oiled areas of PWS

Measure of fitness of the populations will include estimates of densities, foraging success, reproduction and survival.

C. NEED FOR THE PROJECT:

This project will potentially provide the data needed to define the status of several injured resources relative to recovery. The project can potentially identify mechanisms (trophic interactions, population dynamics or toxic effects) responsible for limiting recovery, which should provide rationale and

justification for direct restoration decisions. Because baseline data on abundance is limiting, other measures of the status of populations are necessary to define a recovery endpoint.

D. PROJECT DESIGN

This project will consist of 7 integrated studies and 1 management plan, designed to evaluate the status of 5 injured vertebrate predator populations (harlequin duck, pigeon guillemot, Barrows goldeneye, white-wing scoters, sea otter, and river otter) relative to recovery. Each of the studies will incorporate the spatial variability in predator densities relative to oil effects to test hypotheses 1, 2 and 3.

NVP project participants have established the following near-term milestones for the development of program integration and management.

26 July, 1994: Meeting in Anchorage. Endorsement of the NVP concept by participating principal investigators. Agreement on milestones listed below. Agreement on conventions and protocols for integration of component BPD's.

October, 1994: Scheduled meeting to accomplish the following:
1) Final selection of study sites for component projects
2) Agreement of conventions for maximizing sharing and efficient use of project resources(equipment, vessels, charters, personnel, ...) in order to minimize project costs.
3) Identification of candidates for project manager.

December, 1994: Scheduled meeting to finalize detailed project descriptions for submission to EVOS Trustee Council.

Monthly: Telephone conference calls between project manager and principal investigators to ensure effective information transfer, data management, and project coordination.

April, 1996: Completion of first integrated annual progress report for the NVP project.

Following is a brief description of the purpose, objectives, methods and principal investigator(s) of each project.

1) Project Management: #95025. One full time person will be responsible for project management and support. Duties will include facilitation and coordination of communications, personnel, field operations, data management, integration of results and development of mid-year and annual project assessments, and information transfer. Project milestones will include organizational meetings to develop brief and detailed project descriptions, hiring of a project manager, and at least two scientific coordination meetings. Decisions regarding the integrated study design will be made by consensus of principal investigators. Representation of the nearshore vertebrate predator project (NVP) will be by Leslie Holland Bartels in the capacity to provide project oversight and coordination.

Project Leader: L. Holland-Bartels (NBS) FY 95 cost $65,000

2) Nearshore sea duck project: #95025A. Food habits, condition and over-winter survival of harlequin and Barrows goldeneye and white wing scoters ducks will be estimated within the oil

spill area. Stomach contents will estimate diet and radio telemetry will facilitate estimating survival and habitat use in each species. Hematology and serum chemistry will be evaluated for bioindicators of individual fitness.

Principal Investigators: D. Esler (NBS) and K. Laing (FWS) FY 95 cost $415,000

3) Sea otter abundance and distribution, food habits and population assessment: #95025B. This project will define seasonal patterns of sea otter habitat use relative to shoreline oiling and sea otter densities. Diets will be determined by visual observation at sites within density blocks. Reproduction will be estimated by pup to non-pup ratios and population assessment will be made through evaluation of physiological, biochemical, and morphological measures and population abundance surveys.

Principal Investigators: B. Ballachey and J. Bodkin (NBS) FY 95 cost $168,000

4) Pigeon guillemots and river otters as bioindicators of nearshore ecosystem health: #95025C. Biological markers (biochemical and cellular), reproductive rates and mortality will be used to test for differences between oiled and non-oiled areas. Population size, reproduction and blood chemistry will be estimated from the Naked Island pigeon guillemot colony and compared to Kachemak Bay (under separate study). Live river otters will be captured in oiled and non-oiled areas for comparisons.

Principal Investigators: D. Roby, L. Duffy, and R. Bower (UAF) FY 95 cost $190,000

5) Relation of blue mussel population structure to recovery of injured nearshore vertebrate predators: #95075. Estimates of size structure and abundance of blue mussels (Mytilus trossulus) will be made from oiled and non-oiled ares with different predator densities in PWS. Growth of mussels will be measured and hydrocarbon concentrations estimated. Study site selection will be based on sea otter and sea duck distributions and foraging locations.

Principal Investigator: C. O'Clair (NMFS) FY 95 cost $197,000

6) Relation of inter- and subtidal clam population structure to recovery of injured nearshore vertebrate predators: #95025G & 95094. Estimates of size structure and abundance of common subtidal and intertidal clams (Saxidomus, Protothecа, Mya, Macoma, Clinocardium, Tresus, and Serripes) will be made from oiled and non-oiled areas with different predator densities in PWS. Growth of clams will be measured and hydrocarbon concentrations estimated. Study site selection will be based on sea otter and sea duck distributions and foraging locations.

Principal Investigators: G. VanBlaricom (UW) S.Jewett (UAF) FY 95 cost $210,000

7) Relation of sea urchin population structure to recovery of injured nearshore vertebrate predators: #95087. This project will examine differences in the abundance and size class structure of green urchin (Stronglocentrotus drobachiensis) populations in oiled and non-oiled areas of PWS.

Principal Investigators: S. Jewett (UAF) and T. Dean (CRA) FY 95 cost $65,000

8) Effects of predatory invertebrates on nearshore clam populations: #95025H. In order to evaluate the effects of alternate predators on clam, mussel and urchin populations, this project will estimate invertebrate predator densities and the species composition of their prey. Study site selection will be based on the locations of studies 4, 5 & 6.

Principal Investigator: G. VanBlaricom (UW) FY 95 cost $123,000

Total Cost 1,443,000

Project Title Factors Affecting Recovery of Sea Ducks and their Prey (Subproject #1)

Project # 95025A Revised 8/3/94

Proposed By Daniel Esler (Lead), Karen Laing

Lead Trustee Agency National Biological Survey

Cost FY 95 $415,100

Cost FY 96 $307,800

Cost Total Unknown

Duration Five years

Geographic Area Prince William Sound

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B. INTRODUCTION

Sea ducks are an important avian component of the nearshore ecosystem of Prince William Sound, particularly in winter. During March 1972 - 1991, sea ducks constituted 36% of birds observed from Prince William Sound boat surveys (Klosiewski and Laing 1994). The sea duck community is composed of a diverse assemblage of species, including harlequin ducks (Histrionicus histrionicus), Barrow's (Bucephala islandica) and common (B. clangula) goldeneyes, white-winged (Melanitta fusca), surf (M. perspicillata), and black (M. nigra) scoters, oldsquaw (Clangula hyemalis), buffleheads (B. albeola), and mergansers (Mergus spp.).

Sea duck studies are an appropriate use of restoration funds both because sea ducks were injured by the EVOS and because they affect populations of other injured organisms on which they prey. Sea ducks reside in nearshore habitats, where continuing oil contamination is likely. Harlequin duck populations in the oiled zone of Prince William Sound were documented as injured by the EVOS (Klosiewski and Laing 1994, S. Patten unpubl. data); harlequins are classified as an injured resource. Some evidence of injury to scoters and goldeneyes in the oiled zone was documented by marine bird surveys (Agler et al. 1994, Klosiewski and Laing 1994). The surveys also documented extreme Sound-wide declines of scoters in the two decades preceding the spill. These species were

not studied individually during the Damage Assessment process; given the reliance of sea ducks on nearshore habitats that retained oil, it is probable that such studies would have documented further injury. In addition, sea ducks prey on intertidal and shallow subtidal organisms, such as mussels. These prey organisms were classified as injured resources. It is possible that continuing predation by sea ducks is limiting recovery of these organisms.

Wintering biology and ecosystem interactions of sea ducks are poorly known. Most ecological studies of wintering sea ducks are from Europe or the Atlantic coast (e.g., Stott and Olson 1973, Goudie and Ankney 1986, 1988, Durinck et al. 1993). While some work has been done in the Pacific with sea duck winter foraging (e.g., Vermeer and Levings 1977, Vermeer and Bourne 1982), only two winter studies have been conducted in Alaska (Koehl et al. 1982, Sanger and Jones 1982), neither in Prince William Sound. Most aspects of sea duck wintering biology have not been addressed. For example, it is possible that harlequin duck breeding and winter populations in Prince William Sound are comprised of the same individuals. The Restoration Strategy should include winter studies to examine the possibility that breeding harlequins are failing due to continued contamination or food shortage throughout the winter.

An intensive study of sea duck wintering ecology and ecosystem interactions would serve to elucidate factors that limit populations and may be influencing recovery of injured species and systems. This study is comprised of two related components: survival and movements, and foraging ecology of wintering sea ducks.

C. NEED FOR THE PROJECT Why this Project will Help Restoration

Survival and movements: Overwinter survival of sea ducks in Prince William Sound likely has important, direct effects on annual population dynamics and specific annual variation of wintering numbers in Prince William Sound. Factors that are influencing survival must be understood to identify processes limiting recovery of injured species and systems. Through incorporation of estimated survival rates into population dynamics models (e.g., Goudie et al. 1994), sustainability of populations can be determined.

Sea duck survival is a good measure of the health and productivity of the nearshore system. Sea ducks rely on intertidal and shallow subtidal areas for foraging. Disturbances of these habitats and the invertebrate prey inhabiting them likely directly affect benthic foragers like sea ducks.

Condition and foraging ecology: The foraging ecology component will address several concerns related to restoration of sea ducks and their prey. These concerns include whether (1) trophic interactions, competition, food availability, or food quality are limiting recovery of sea ducks, (2) injured benthic invertebrates are not recovering because they are important sea duck food items, or (3) oil continues to be ingested and/or accumulated by sea ducks.

Herring eggs might be an important food for sea ducks in late winter (Bayer 1980, Vermeer 1982). Spring condition has important implications for subsequent reproductive performance in many waterfowl species (e.g., Esler and Grand 1994).

D. PROJECT DESIGN

1. Overall Objectives

1) Identify major causes of sea duck mortality and limiting effects of winter survival for sea duck recovery

2) Examine whether oil-related pollutants, trophic interactions, competition, food availability, or food quality are limiting recovery of sea ducks

3) Identify major sea duck prey species, so that related studies of injured benthic invertebrates can evaluate whether those species are not recovering because they are important sea duck food

Survival and Movements

Objectives: In Prince William Sound, there are several potential sources of sea duck winter mortality including harvest, starvation or exposure, predation, disease, and exposure to contaminants, including residual oil. To identify causes of mortality and potential limiting effects of winter survival for recovery of species, we propose a study to measure survival and mortality sources in harlequin duck and Barrow's goldeneye females. The study would address the following questions:

-does overwinter survival limit population growth of sea duck species?

-what are sources of mortality? Is mortality higher in oiled habitats than unoiled habitats?

-what are frequency and distance of wintering sea ducks movements? Do they move among oiled and unoiled habitats?

-how are sea ducks distributed throughout the Sound?

-do harlequin ducks marked during fall and winter breed in Prince William Sound?

2. Methods.

Sea ducks would be captured during fall by a variety of techniques, potentially including: driving molting flocks, net guns, rocket nets on roosting sites, mist nests, night-lighting, and capturing from underwater using scuba or rebreather technology. Females would be outfitted with radio-transmitters. Only females would be assessed because their survival dictates population dynamics (Goudie et al. 1994). Capturing, marking, and tracking birds will be conducted cooperatively with Alaska Department of Fish and Game investigators studying harlequin ducks.

Transmitters equipped with mortality switches would be implanted in the body cavity with an external antenna. Surgeries would be conducted by a certified veterinarian experienced in avian implant surgeries. Radio telemetry flights would be conducted weekly through winter and early spring. Flights would locate each marked individual and note status, flock size, coordinates, and general habitat. For birds indicated as dead, the carcass would be recovered by boat or float plane as soon as possible. Collected carcasses would be examined for causes of mortality.

We would collect blood samples from captured birds to measure parameters associated with oil-related toxicity. We would examine leucocyte counts, differential white blood cell counts,

electrophoretic measurements of serum immunoglobins, ELISA assays of interleukins, and serum chemistries. Haptoglobin assays and immunoglobin typing assays will be conducted by the University of Alaska, Fairbanks in cooperation with investigators of pigeon guillemots (Project 95025C). Cell counts will be performed by a contract with PML in cooperation with the sea otter project (Project 95025B). Working with Purdue University scientists (also on contract with the sea otter project), we will investigate the feasibility of developing assays for macrophage function.

We propose analyzing existing data from boat-based marine bird population surveys conducted in March (1972-73, 1984-85, 1990-91, 1993) (Klosiewski and Laing 1994, Agler et al. 1993, Agler et al. unpub. data) and aerial surveys conducted in March and October (1989-90) (Klosiewski and Hotchkiss N.D.) by the U.S. Fish and Wildlife Service to clarify winter distribution of sea ducks in the Sound. Combining survey data with existing information on shoreline type will also allow us to formulate hypotheses concerning habitat factors affecting distribution.

D. CONDITION AND FORAGING ECOLOGY

Objectives: We propose a foraging ecology study that would assess variation in physiological condition and prey species of harlequin ducks, Barrow's goldeneyes, and white-winged scoters. Also, potential competition within the sea duck community and with other benthic foragers (e.g., sea otters) would be determined. The study would answer the following specific questions:

-does condition (as a measure of health) change through winter? Is condition related to habitat (including oiled vs. nonoiled)?

-what taxa and size classes of prey are sea ducks eating in the winter?

-does potential competition exist among benthic foraging predators (including sea ducks, sea otters, invertebrate predators) for food items of sea ducks?

-are prey species abundances linked to specific habitats, including oiled vs. unoiled habitats?

-does energy expenditure (as measured by foraging behavior) differ among habitats (including oiled vs. unoiled)?

Methods: We would assess condition and diets of female harlequin ducks, Barrow's goldeneyes, and white-winged scoters by collecting approximately 40 individuals of each species annually, for 2 or 3 seasons. Upon collection, the digestive tract would be dissected immediately, and contents of the esophagus, proventriculus, and gizzard would be preserved and stored separately. In the laboratory, foods would be sorted, identified, analyzed for oil, and their volume and dry weight measured. Body composition analysis would be conducted as described by Esler and Grand (1994).

Data from Natural Resource Damage Assessment (NRDA) and Restoration studies on harlequin ducks and other sea ducks is expected to be available presently. Pending analysis of these food studies, we will evaluate whether to reduce proposed collections of birds.

We would assess foraging behavior by observing marked birds for periods during which the proportion of time spent foraging would be measured. Time spent foraging during these periods would be measured either through continuous observations, or by sampling behavior instantaneously

at pre-determined intervals (e.g. every 20 seconds)(Altmann 1974). By identifying habitats used by focal birds at each sampling point, we would also quantify time spent foraging in different habitats (e.g., Laing and Raveling 1993).

E. PROJECT DESIGN

1. Schedule

To adequately understand factors influencing sea duck populations and annual variation, a study of 5 years or longer should be initiated. Field work supported with FY95 funds would begin in fall 1994 and continue through March 1995. Annual reports would be completed by the winter following field work.

2. Technical Support

Contracts for laboratory work will be required for physiological condition and digestive tract content analysis, and for consultation with a statistician to insure appropriate analysis techniques are used.

3. Location

Prince William Sound, at study sites to be determined in conjunction with investigators studying sea otters and benthic invertebrate communities.

F. PROJECT IMPLEMENTATION

This project would be implemented by the Alaska Science Center of the National Biological Survey, and by the U.S. Fish and Wildlife Service. Personnel in these agencies have extensive experience studying population dynamics of waterfowl in Alaska.

G. COORDINATION OF INTEGRATED RESEARCH EFFORT

This sub-project is a joint effort by biologists in two trust agencies (NBS and USFWS). Success of this project also relies on other investigators within the Nearshore Project collecting information on (1) prey abundance, size class, and distribution and (2) foraging ecology of other predators of benthic invertebrates such as sea otters, octopus or sea stars. We are in close contact with potential investigators of these projects, and with investigators of the harlequin duck breeding population. We plan to share proposals and results, and to realize cost-efficiencies by working at common field sites. The University of Alaska, Fairbanks (Project 95025C) will cooperate by processing blood samples as describe above.

These studies of wintering sea duck ecology in Prince William Sound would be most valuable as concurrent, integrated investigations. For example, studies of foods and trophic interactions would identify possible food limitations and pathways for pollutants, and seasonal changes in condition. Survival studies are necessary to link these factors to risk and causes of mortality. Habitat studies could further advance our understanding by identifying underlying, proximate causes of variation in food, behavior, and condition that may affect survival.

H. PUBLIC PROCESS

We would involve the public in this sub-project by holding information-sharing meetings in local communities. We would use these meetings to share our results, to answer questions, and to solicit information from residents about their observations of sea ducks. We would also request contributions of digestive tract contents from birds killed by subsistence hunters. In addition, we would solicit use of local boats and other services through standard government contracting procedures.

I. PERSONNEL QUALIFICATIONS

Daniel Esler is a Wildlife Research Biologist for the Alaska Science Center, National Biological Survey with a Master of Science in Wildlife Ecology, Department of Wildlife and Fisheries Sciences, Texas A&M University (Avian associations with hydrilla) and Bachelor of Science in Biology/Environmental Studies, Northland College, Ashland, WI. He has nine publications in national peer reviewed journals such as Wildlife Management, Wilson Bulletin, Journal of Field Ornithology, Condor and others. Karen Laing is a Wildlife Biologist for Migratory Bird Management, U.S. Fish and Wildlife Service, Anchorage, Alaska with a Master of Science in Ecology, Univ. of California, Davis (Habitat and food selection, behavior and body composition of nesting Emperor Geese), Bachelor of Science in Biology, The Evergreen State College, Olympia, Washington, and Bachelor of Arts, Stanford University. Since 1991 she has designed, conducted and analyzed population surveys of waterfowl throughout the state. Earlier she was the Principal Investigator for Exxon Valdez Oil Spill Damage Assessment Bird Study No. 2 and conducted boat surveys of marine bird and mammal populations in Prince William Sound, Alaska. Her publications/reports include Oil Spill Natural Resources Damage Assessment Bird Study No. 2., publication in Condor, Applied Animal Behavoral Science, and Raptor Research and various reports.

J. BUDGET

Personnel	
Principal Investigator GS-11, 1.0 FTE	58,000
Wildlife Biologist GS-11, 0.3 FTE	17,400
Research Biologist GS-9, 1.0 FTE	46,000
Bio. Tech. GS-5 (3 X .33years), 1.0 FTE	29,000
Veterinarian contract (+ NBS agency match)	15,000
Aircraft Charter	55,000
Boat Charter	35,000
Travel	8,000
Equipment	
Radios (150 at $175)	26,300
Other	40,000
Contracts	
Body Composition	25,000

Food Habits	5,000
Statistical Consultation	2,000
Blood analysis	7,500
Commodities	9,000
Publication Costs	3,000
Administration/Overhead	33,900
Total	$415,100

K. LITERATURE CITED

Agler, B. A., P. E. Seiser, S. J. Kendall and D. B. Irons. 1994. Marine bird and sea otter populations of Prince William Sound, Alaska: population trends following the T/V Exxon Valdez oil spill. Restoration Project No. 93045. Unpubl. Rep., U.S. Fish and Wildlife Service, Anchorage, Alaska. 60 pp.

Altmann, J. 1974. Observational study of behavior: sampling methods. Behaviour 49:226-265.

Bayer, R. D. 1980. Birds feeding on herring eggs at the Yaquina Estuary, Oregon. Condor 82:193-198.

Durinck, J., K. D. Christensen, H. Slov and F. Danielsen. 1993. Diet of the Common Scoter Melanitta nigra and Velvet Scoter Melanitta fusca wintering in the North Sea. Ornis Fennica 70: 215-218.

Esler, D. and J. B. Grand. 1994. The role of nutrient reserves for clutch formation by female northern pintails in subarctic Alaska. Condor 96:422-432.

Goudie, R. I., and C. D. Ankney. 1986. Body size, activity budgets, and diets of sea ducks wintering in Newfoundland. Ecology 67:1475-1482.

Goudie, R. I., and C. D. Ankney. 1988. Patterns of habitat useby sea ducks wintering in southeastern Newfoundland. Ornis Scand. 19:249-256.

Goudie, R. I., S. Brault, B. Conant, A. V. Kondratyev, M. R. Petersen, and K. Vermeer. 1994. The status of sea ducks in the North Pacific rim: toward their conservation and management. Proc. North Am. Wildl. and Nat. Res. Conf.

Klosiewski, S. J. and L. A. Hotchkiss. N.D. Assessment of injury to waterbirds from the Exxon Valdez oil spill: surveys to determine distributiona and abundance of migratory birds in Prince William Sound and the northern Gulf of Alaska. Exxon Valdez Natural Resources Damage Assessment Bird Study No. 2, 1989 draft report. U.S. Fish and Wildlife Service, Anchorage, Alaska.

Klosiewski, S. J. and K. K. Laing. 1994. Bird populations of Prince William Sound, Alaska, before and after the Exxon Valdez oil spill. Exxon Valdez Oil Spill Natural Resources Damage Assessment Bird Study No. 2. U.S. Fish and Wildlife Service, Anchorage, Alaska.

Koehl, P. S., T. C. Rothe, and D. V. Derksen. 1982. Winter food habits of Barrow's goldeneyes in southeast Alaska. Pp. 1-5 in Marine birds: their feeding ecology and commercial fisheries relationships (D. N. Nettleship, G. A. Sanger, P. F. Springer, Eds.). Proc. Pacific Seabird Group Symp., Can. Wildl. Serv. Spec. Pub.

Laing, K. K. and D. G. Raveling. 1993. Habitat and food selection by Emperor Goose goslings. Condor 95:879-888.

Sanger, G. A., and R. D. Jones, Jr. 1982. Winter feeding ecology and trophic relationships of

oldsquaws and white-winged scoters on Kachemak Bay, Alaska. Pp. 20-28 in Marine birds: their feeding ecology and commercial fisheries relationships (D. N. Nettleship, G. A. Sanger, P. F. Springer, Eds.). Proc. Pacific Seabird Group Symp., Can. Wildl. Serv. Spec. Pub.

Stott, R. S., and D. P. Olson. 1973. Food-habitat relationship of sea ducks on the New Hampshire coastline. Ecology 54:996-1007.

Vermeer, K. 1982. Food and distribution of three Bucephala species in British Columbia waters. Wildfowl 33:22-30.

Vermeer, K., and N. Bourne. 1982. The white-winged scoter diet in British Columbia waters: resource partitioning with other scoters. Pp. 30-38 in Marine birds: their feeding ecology and commercial fisheries relationships (D. N. Nettleship, G. A. Sanger, P. F. Springer, Eds.). Proc. Pacific Seabird Group Symp., Can. Wildl. Serv. Spec. Pub.

Vermeer, K., and C. D. Levings. 1977. Populations, biomass, and food habits of ducks on the Fraser Delta intertidal area, British Columbia. Wildfowl 28:49-60.

Project Title Sea otter abundance and distribution, food habits and population assessment [A component of "Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound]

Project # 95025B Revised 8/3/94

Proposed by B.E. Ballachey and J.L. Bodkin, National Biological Survey
A. Rebar, Purdue University

Lead Trustee Agency National Biological Survey

Cost FY 95 $168,100

Cost FY 96 $138,500

Cost Total $335,800

Duration 3 Years

Geographic Area Prince William Sound

Injured Resource Sea Otters

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B. INTRODUCTION

Sea otters are the most abundant of the the Alaskan marine mammals affected by the *Exxon Valdez* oil spill (EVOS). They were hunted almost to extinction in the 17th and 18th century, but have since reoccupied most of their original range in Alaska, including areas in Prince William Sound (PWS). Otters play a major role in structuring the nearshore community through predation on nearshore marine invertebrates.

Sea otters were severely injured by the EVOS, with an estimated initial loss throughout the spill area of approximately 4000 animals. Sea otters in PWS suffered the greatest effects, and oil-related injury to the otters residing in western PWS appeared to persist through at least 1991. Although there is evidence that the health of the otters has improved since 1991, there is uncertainty about the status of recovery of sea otters in oiled areas. Specifically, concerns arise in regard to (1) relatively low densities and (2) poor survival of juvenile sea otters in western PWS. Survival rates of juveniles in western PWS were significantly lower than in non-oiled areas in both 1990-91 and 1992-93. However, survival rates for both areas improved in 1992-93 compared to 1990-91. Low densities of sea otters are observed in areas that were heavily oiled relative to lesser or non-oiled

areas. For example, densities of sea otters around northern Knight Island and Naked Island are relatively low compared to the densities observed around Green Island. Factors (including oil effects) causing varying otter densities and juvenile survival rates are not understood. Availability of prey for sea otters may be a contributing factor.

Further concern over the health of sea otters in oiled areas arises from differences in blood values of sea otters living in oiled versus non-oiled areas of PWS. We have observed increased levels of blood serum enzymes indicative of liver disorders (ALT, GGT), and white cells (eosinophils) that may be related to subclinical disease from oil exposure. The increased levels of serum enzymes are consistent with changes observed in oiled otters exhibiting kidney and liver pathologies at the rehabilitation centers. The differences between otters in oiled and non-oiled areas persisted through 1992; no blood samples have been collected since then.

This project is a component of an integrated effort to examine recovery of injured species in the nearshore ecosystem. We address the status of recovery of sea otters in PWS and the interactions among sea otters and other species in the nearshore community that have potentially been injured by oil exposure. Specific accomplishments of this project will include evaluation of (1) the extent of recovery, (2) factors contributing to differences in densities, (3) health and condition, and (4) food habits of sea otters among areas in PWS that vary in oiling and in densities of otters.

Sea otter studies previously funded by the Trustees include NRDA Marine Mammal Studies #6 & #7, and Restoration Project 93043, conducted on sea otters in PWS from 1989 through 1994. This project represents a logical continuation of certain elements of those studies.

C. NEED/HELP TO RESTORATION

This project will (1) monitor recovery of sea otters through the collection of data on the abundance and distribution, (2) assess possibile chronic effects of oil exposure on sea otters in oiled areas of PWS, and (3) enhance our understanding of the role that sea otters play in structuring nearshore communities that have been impacted by the EVOS. Information will be obtained on factors limiting recovery of sea otters and on alterations in the nearshore community affected by or affecting sea otters.

D. DESIGN

This project has 3 elements:

- Surveys: to evaluate abundance, distribution, reproductive rates, and mortality.
- Health and Condition: to evaluate sea otter body condition and health and possibly hydrocarbon burdens (if warrented, based on shellfish and sediment hydrocarbon results).
- Food Habits: to evaluate the role of sea otters as a top-level predator in the nearshore community.

1. Objectives

SURVEYS

a. Monitor sea otter recovery: conduct a survey of sea otter abundance and distribution in PWS.

b. Conduct seasonal surveys of sea otter abundance and distribution at specific study sites.

c. Conduct a survey of sea otter reproductive rates, based on ratios of pups to adults.

d. Quantify age distribution of sea otters dying over the winter at Green Island.

HEALTH AND CONDITION

a. Assess body condition of sea otters.

b. Assay markers of immune function in sea otters.

c. Collect fat tissue samples for potential analyses of hydrocarbon levels.

FOOD HABITS

a. Quantify prey selection and foraging efficiency of sea otters at specific study sites.

2. Methods

Study sites will be selected based on discussions with other investigators in the integrated nearshore ecosystem project. We anticipate identifying up to 4 sites in PWS to be the focus of this project.

SURVEYS

- PWS-wide aerial survey (methods as developed under Restoration Study # 93043) of distribution and abundance, summer 1995. This element of the project is for monitoring recovery.

- Site-specific aerial surveys of distribution and abundance, quarterly (spring, summer, fall, winter 1995).

- Boat-based survey of relative abundance of adults and pups, to estimate reproductive rates. The ratio of the number of pups to adults will be estimated and compared to existing data on pre- and post-spill ratios.

- Carcass recovery - survey Green Island shorelines in early spring to recovery beach-cast carcasses, and estimate age at death from reading of premolar tooth.

HEALTH AND CONDITION

- Capture sea otters at study site - collect body measurements (weight, length, and girth), blood, fat biopsy for possible hydrocarbon analysis, premolar tooth to estimate age; and flipper-tag otters with unique color-coded tags to allow identification of individuals.

- Evaluate immune function through 1) B & T cell activities, including levels of IGG, IGE, IGA, and IGM as indicators of humeral immunity, and 2) blast transformation assays to measure T-cell activities. Laboratory work to be done in cooperation with Dr. Alan Rebar at Purdue University.

- Evaluate blood CBC's and chemistries - laboratory work to be done by PML laboratories.

FOOD HABITS

- Observations of foraging behavior at study sites (observe all otters present, with preferential collection of data on flipper-tagged individuals when possible). Data to include prey items, prey sizes, # prey recovered/dive and dive times. Foraging data to be collected twice, in late winter and late summer of 1995.

3. SCHEDULE

TIME		ACTIVITY
FALL 1994	1.	Develop detailed study plan working in conjunction with other NVP investigators to maximize efficiency of data collection
	2.	Permit application for otter capture.
SPRING 1995	1.	Carcass recovery - Green Island
	2.	Site specific surveys of sea otter distribution and abundance
SUMMER 1995	1.	Survey of sea otter distribution and abundance - all PWS
	2.	Site specific survey of sea otter distribution and abundance
	3.	Sea otter capture at specific sites
	4.	Foraging observations at specific sites
FALL 1995	1.	Site specific survey of sea otter distribution and abundance
WINTER 1996	1.	Site specific survey of sea otter distribution and abundance
	2.	Foraging observations at specific sites
SPRING 1996	1.	Complete data analyses and prepare reports on 1st year work
	2.	Carcass recovery - Green Island
SUMMER 1997	1.	Survey of sea otter distribution and abundance - all PWS

4. Technical Support

The primary need for technical support is integration of data collected on other components of the Nearshore Ecosystem project with data collected on sea otters.

5. Location

The project will be conducted in western PWS. Communities that will be involved or affected include New Chenega (may provide a base for winter operations), Cordova and Whittier. The extent of involvement of these communities will depend on finalizing the project design, in coordination with other investigators, to identify specific study sites.

E. PROJECT IMPLEMENTATION

This component of the Nearshore Ecosystem project will be implemented and overseen by staff of the sea otter project, Alaska Science Center (ASC), NBS. Most of the equipment needed for project activities outlined herein is already owned by the ASC.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be a component of and will coordinate closely with other projects in the Nearshore Ecosystem project.

G. PUBLIC PROCESS

This project description was developed in conjunction with other investigators studying injured resources in the nearshore ecosystem. Summaries of our early discussions on potential directions of the work were sent to participants in the nearshore ecosystem group at the April 1994 Workshop, with invitations to participate in or provide comments on project development.

H. PERSONNEL QUALIFICATIONS

The Principal Investigators for this study are Dr. Brenda Ballachey and Mr. Jim Bodkin of the Alaska Science Center. They have over 20 years of combined experience studying sea otters, including implementation and oversight of previous NRDA and Restoration studies on sea otters, and have developed many of the techniques to be used in data collection. Blood and immune functions analyses will be overseen by Dr. Alan Rebar, clinical pathologist and Dean of Graduate Studies at the School of Veterinary Medicine at Purdue University.

I. BUDGET

FY 95 (assume start April 1, 1995)

Personnel	
6 months - GS11 wildlife biologist @ 5000/mo	25,000
6 months - GS6 biotechnician @ 3000/mo	18,000
0.5 month - GS14 Project Manager @ 7500/mo	3,700
Travel - Estimated total for all elements. Specific costs will require ID of specific sites and cost-sharing with other subproject components.	15,000
Contractual Services	
Support vessel for capture - 21 days @1400/day	29,400
Aerial survey - summer 1995 - 80 hrs @ $200/hr	16,000
Seasonal surveys, specific sites/80 hrs @ $200/hr	16,000
Blood CBC's, Chemistries, Haptoglobins & Interleukins	4,000
Assays of immune function - 80 @ $125	10,000

Commodities	
Fuel - 2000 gal. @ $3.00/gal	6,000
Food for field camps	2,700
Miscellaneous field camp supplies	2,000
Equipment	
Maintenance/Repair	5,000
Field gear & Safety equipment	3,000
Administrative Overhead	12,300
Total	168,100

FY 96

Personnel	93,400
Travel	10,000
Contractual Services	16,000
Commodities	2,000
Equipment	2,000
Administrative Overhead	15,100
Total	138,500

FY 97

Personnel	7,000
Travel	2,000
Contractual Services	18,000
Administrative Overhead	2,200
Total	29,200
Grand Total	335,800

A. COVER PAGE

1. Project Title: **Pigeon Guillemots and River Otters as Bioindicators of Nearshore Ecosystem Health in Prince William Sound.**

Project Number: **95025-C** Revised 8/3/94

2. Principal Investigator:

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4. Cost of Project:

FY 95: $189,593
FY 96: $195,559
FY 97: $176,018

TOTAL: $561,170

5. Start up date: 1 October 1994

Completion date: 30 September 1998

6. Geographic Area: Prince William Sound

7. Contact Person:

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B. INTRODUCTION

This study is relevant to EVOS ecosystem research because it is designed to develop a better understand of how petroleum hydrocarbon pollution affects the nearshore marine environment in Prince William Sound (PWS). Results from this study will allow us to test biostatistical models that predict ecosystem health and environmental deterioration. Use of bioindicators will lead to a better understanding of ecosystem processes in PWS. Our proposal describes a research approach for assessing the biological and ecological significance of contaminants present in the environment. In this research our focus is the pigeon guillemot (*Cepphus columba*) and river otter (*Lutra canadensis*) as indicators of environmental stress.

The guillemot and river otter models will be used as upper trophic level sentinels of bioavailable contaminants, such as oil, and as surrogates to estimate the potential exposure and risk to other organisms that are components of the PWS nearshore ecosystem (Leighton 1985; Peakall et al. 1986). This research approach utilizes biomarkers (biochemical and cellular indicators of exposure), reproduction rates, and data on mortality to identify and quantify the present level of variability within the PWS ecosystem. This approach is necessary because evaluation of the potential for exposure to contaminants in the environment is extremely complex due to the differences in the biological availability of contaminants at different trophic levels and varying toxicological interactions within exposed organisms.

Focusing on the biological responses in indicator species overcomes many of the limitations that plague chemical analysis of the environment (Payne et al. 1987). While measuring body burdens is an important aspect of using a biomonitor, equally important is the measurement of biomarkers because they:

1) Provide evidence of exposure to compounds that do not bioaccumulate or are rapidly metabolized;

2) Integrate the toxicological interactions resulting from exposure to complex mixtures of contaminants;

3) Present a biologically relevant measure of the cumulative adverse effect; and

4) Measure early responses of organisms to toxicant exposure and serve as short-term predictors of long-term adverse effects.

By proper selection of a bird and a mammal from an upper trophic level, specific sources and routes of exposure can be identified. Analysis of biological markers in birds and mammals may offer a means of identifying exposures due to toxic sites from those due to other natural exposures. In guillemots we will measure induction of immune system, acute phase proteins, and cytokines as biomarkers. We will compare our results from guillemots with previous work on other bird species (Fry and Lowenstine 1985), our PWS work on river otters (*Lutra canadensis*), and results from current research on guillemots in Kachemak Bay. The earlier work on river otters and our current work on guillemots in Kachemak Bay will validate our study of guillemots and river otters in PWS and our biostatistical model. This model (Duffy et al. in press) is far more detailed than those for any bird, and maintains a mammalian component for human comparisons. While guillemots are easier to capture and handle than otters during the breeding season, including otters as a component of the research may be essential because guillemots are principally available during nesting, whereas otters are year-round residents.

The purpose of our study is to assess whether populations of pigeon guillemots and river otters in PWS are recovering from the effects of the *Exxon Valdez* oil spill, and, if not, why this might be the case. We will test hypotheses that relate to possible routes of hydrocarbon contamination in the top-level predators, and use biomarkers to assess the effects of such contamination on the health of these populations. Finally, our study will provide information necessary to restore populations of guillemots and river otters, should such actions be required.

Our project is closely integrated with other research designed to assess the effects of the oil spill on nearshore vertebrate predators and their prey. We have proposed the only project that will evaluate predators that feed primarily on marine fishes in the nearshore environment. Moreover, results from our investigations are essential to provide an understanding of whether these injured resources are recovering and what role lingering effects from oil contamination might play in the overall health of the Prince William Sound ecosystem.

C. PROJECT NEED

Pigeon Guillemots

We are currently developing pigeon guillemots as an avian bioindicator for coastal ecosystems in Alaska. This research is currently underway in Kachemak Bay, Alaska, and will provide crucial baseline information for the proposed work in PWS. Guillemots are the most neritic members of the marine bird family Alcidae, which includes the murres, puffins, and auks. Pigeon guillemots are the best-suited species for monitoring nearshore ecosystem health for several reasons: (1) they are a common and widespread seabird species breeding in coastal Alaska, and in PWS specifically (Sowls et al. 1978, Sanger and Cody 1993); (2) they forage within 5 km of the nest site in the subtidal and nearshore zones (Drent 1965, Kuletz 1983); (3) unlike most seabird species, they do not breed in large, dense colonies; (4) they raise their young almost entirely on fish, preying primarily on intertidal and nearshore bottomfish (e.g., blennies, sculpins) and on nearshore schooling fish (e.g., sandlance; Drent 1965, Kuletz 1983); (5) the one- or two-chick broods are fed in the nest until the young reach adult body size.

Guillemots first breed at 2 years of age and adults have high annual survivorship (85%, Asbirk 1979). Young guillemots normally return to the natal area to breed. Nest site fidelity of breeding pairs is high and even in instances when pairs relocate nests, the distances involved are usually small (< 30 m). Eggs are laid in a wide variety of natural crevices and holes, but most nest sites in the study area are located in cavities in rock masses (K. Kuletz and K. Oakley, pers. comm). Eggs are usually laid about 50 cm from the entrance of the nest crevice (Asbirk 1979), thus eggs, chicks, and attending adults are frequently accessible for data collection. Guillemots are unusual among alcids in that they normally lay two-egg clutches and raise two chicks per nesting attempt. Guillemots carry whole fish in their bills to the nest-site crevice to feed their young. Thus individual prey items can be identified, weighed, measured, and, if necessary, collected for contaminant analyses.

Other potential avian bioindicators of Alaska coastal ecosystems are unsuitable for several reasons. *Larus* gulls (e.g., glaucous-winged and herring gulls) have been used as models for studies on the sublethal effects of crude oils on marine birds (Peakall et al. 1982; Miller et al. 1978; Lee et al. 1985, 1986) and are widespread and common components of Alaska coastal ecosystems. But gulls frequently feed at dumps and scavenge fish offal from fishing vessels where exotic contaminants may be encountered. *Larus* gulls may also commute long distances to utilize these food sources; consequently the source of anthropogenic contaminants in the diet may be difficult to determine. Other alcid species (e.g. puffins, murres) and kittiwakes (*Rissa tridactyla*) forage offshore (up to 100 km from the nest site) on pelagic schooling fish and are restricted to breeding at a few relatively inaccessible colonies in the study area. Thus they are inappropriate bioindicators of nearshore ecosystem health and potential contaminants in food webs close to breeding colonies. In addition, these species are sensitive to social stimulation at the breeding colony. Thus direct mortality from plumage oiling can result in reduction of colony-wide reproductive success even in the absence of a contaminated food supply. Other alcids that forage in the neritic zone and are noncolonial (e.g., marbled murrelet) may nevertheless forage at considerable distance from nest sites, and active nests high in mature timber are extremely difficult to locate and monitor.

Guillemots have served as subjects in previous studies to assess the effects of ingested crude oil on marine birds (Peakall et al. 1980). Nestling black guillemots (*Cepphus grylle*), a very closely-related sibling species of the pigeon guillemot, were fed single doses of weathered South Louisiana crude oil (WSLC) and subsequently monitored in their natural nest site where they were cared for by their parents. These experiments demonstrated that single doses of as little as 0.1 ml WSLC resulted in declines in growth rates, increases in plasma sodium levels and increases in nasal and adrenal gland masses. The effects of

the single dose were not transient, as nestlings that were dosed at roughly two weeks post-hatch were 20% lighter than controls at five weeks of age (just prior to fledging). Such persistent sublethal effects may have serious consequences for post-fledging survival. Peakall et al.'s (1980) study clearly demonstrates that guillemot nestlings living normally in their chosen habitat are tolerant to the handling and disturbance associated with assessing pollutant toxicity.

We will monitor blood parameters in pigeon guillemots breeding at Naked Island (oiled area) and Fool Islands (non-oiled area), PWS. Data on population size, reproductive success, prey composition and provisioning rates of breeding guillemots will be collected at these same sites as part of an on-going research project conducted by the Fish and Wildlife Service and directed by Dr. David Irons. Collection of blood samples nestling and adult guillemots will be coordinated closely with Dr. Irons' field crew. Naked Island supports the highest breeding densities of guillemots in PWS (Sanger and Cody 1993) and a breeding population that is adequate for the proposed research (Oakley 1981, Kuletz 1983). The following parameters will be measured at accessible guillemot nests, in coordination with Dr. Irons' studies, as indices of parent-offspring productivity: (1) chick feeding rates; (2) chick meal size; (3) taxonomic composition of chick diets; (4) biochemical composition of chick food items; (5) chick growth rates and body composition; (6) nestling survival; and (7) fledging age, body mass, and body composition. Productivity will be compared with blood parameters used to monitor contaminant exposure. Nondestructive indices to stress induced by petroleum hydrocarbon ingestion will be used, such as levels of selected plasma immunoglobulins, blood plasma proteins, cell counts, and interleukin levels in blood of adults and chicks, body mass and body composition of adults and chicks, chick growth rates, and fledgling mass. These data will then be used to evaluate the factors that limit guillemot productivity. The results of this research project will provide us with the background necessary to use guillemots as avian indicators of nearshore ecosystem health in PWS.

The population status of pigeon guillemots in PWS and the northern Gulf of Alaska has been of concern for nearly a decade due to declines in number of adults observed on survey routes (Klosiewski and Laing, unpubl. data). Low fledging success has been attributed to changes in the abundance and distribution of forage fish resources within foraging range of guillemot nests. There is a troubling lack of information on the factor(s) responsible for poor reproductive performance (Oakley and Kuletz, unpubl. ms.).

River Otters

River otters inhabiting marine environments make extensive use of, and concentrate their activities in intertidal and subtidal zones (Bowyer et al. in press; Dubuc et al. 1990; Larsen 1984; Woolington 1984). These high trophic-level carnivores are long-lived ($\geq$ 12 years of age—Doctor et al. 1987), and occur at densities of 0.2-0.8 otters/km of shoreline throughout the Gulf of Alaska (Testa et al. in press). River otters are extremely sensitive to aquatic pollutants, yet continued to reside within the area of oil-contaminated shorelines in Prince William Sound, Alaska following the *Exxon Valdez* oil spill (Testa et al. in press). These characteristics make river otters an excellent model for assessing the effects of marine pollution on mammals, and provide an overall index to the health of the nearshore ecosystem.

River otters living in marine environments consume a diet dominated by marine fishes, which they prey upon in intertidal and subtidal zones, although they also consume a wide variety of marine invertebrates (Bowyer et al. in press, Larsen 1984, Stenson et al. 1984.). Such nearshore areas are the most often affected by pollution. For instance, oil spilled from the *Exxon Valdez* contaminated extensive areas of the intertidal and subtidal environments, which was reflected in a loss of dietary diversity for otters inhabiting oil-contaminated shorelines (Bowyer et al. in press). Likewise, river otters living in oiled areas exhibited a significantly lower body mass (when controlled for sex and total body length) than did otters inhabiting oil-free areas (Duffy et al. 1993). Otters have extremely large home ranges (20-40 km of shoreline--Bowyer et al. in review, J. Mammal.), and hence integrate the effects of pollution over wide areas.

Population dynamics of European otters (*Lutra lutra*) in coastal areas have been linked to the abundance of marine fishes (Kruuk et al. 1991); this is also likely the case for river otters inhabiting PWS. We previously demonstrated that the diversity of otter diets declined significantly following the *Exxon Valdez* oil spill (Bowyer et al. in press). Similarly, the body mass of otters was significantly lower on oiled,

compared with non-oiled, areas of PWS (Duffy et al. 1993, in press). Unfortunately, we were unable to determine whether such changes were caused by toxicological effects of oil on otters, changes in prey availability, or loss of habitat (Bowyer et al. in press a). We were unable to resolve this question because too few otter study sites were also sampled by those studying fishes. We have overcome this problem in the present study by close coordination with the sea urchin proposal (95087). We will share study areas with this project, and Steve Jewett has agreed to sample fishes along the same underwater transects used to sample urchins – this will add no additional cost to either proposed study. Fish along transects will be identified to the lowest possible taxon; gadiforms, coitids, and other fish will be speared opportunistically. These samples will be frozen and archived for potential future analyses. If biomarkers from otter blood indicate exposure to oil and no oil residue is recovered from the pelage of otters, then we will evaluate these fish for oil contamination (e.g., cytochrome P-450 analysis). Oil contaminated fishes likely persist in PWS (S. Jewett, pers. comm.; Duffy et al. in press), but we believe contamination of pelage and subsequent grooming by otters is a more likely route of oil exposure (Duffy et al. 1994, Baker et al. 1981). Although river otters do consume mussels (*Myrilus edulis*) in PWS (Bowyer et al. in press), we were able to reject otters feeding on mussels as a hypothesis to explain elevated biomarkers in river otters (Duffy et al. in press).

We will evaluate changes in population trends of river otters by examining the frequency of latrine site abandonment on oiled and non-oiled areas. Kruuk et al. (1989) demonstrated a strong positive relationship between number of resident females and number of active holts (latrine sites) for European otters living in a marine environment. Likewise, Testa et al. (in press) showed that number of active latrines varied with estimated population size for river otters in PWS; however, too few areas were sampled to establish a regression line between these variables. Nonetheless, it is likely that abandonment of latrines provides a useful index to otter abundance, and can be used to evaluate trends in otter populations. Indeed, Duffy et al. (1994) documented that river otters throughout oiled areas of PWS abandoned latrine sites at a rate over three times greater than did otters inhabiting non-oiled areas. We will not be sampling all of the same areas we previously examined because of integration with other studies of vertebrate predators in the nearshore environment. If differences in oiled and non-oiled areas still exist, it would be possible in subsequent years to evaluate the same sites that we sampled in 1991 to compare current values against that benchmark. Measuring trends in otter populations will not increase the costs of this study because we must evaluate these sites in the process of setting live-traps for otters in order to collect blood samples for biomarker assays.

We previously developed a nonlethal method for evaluating the effects of marine pollutants (in this instance, crude oil) on the blood-enzyme chemistry of river otters (Duffy et al. in press). We first noted that blood haptoglobins (an acute-phase protein) were elevated in otters inhabiting areas where crude oil was prevalent one year following the oil spill (Duffy et al. 1993). Even two years after the oil spill and a major effort to clean oil-contaminated shores, we were able to construct a biostatistical model, using logistic regression, in which we classified > 86% of river otters correctly as having been captured in oiled or non-oiled zones. This highly sensitive model used only blood values for haptoglobin, interleukin 6 (a cytokine), and AST (a liver enzyme). Our approach has already been extended for evaluating other marine mammals (Zenteno-Savin et al. 1993), and may be applicable to other vertebrates, especially marine birds. The strength of this line of research is that we have already developed the expertise necessary to live-capture river otters, have base-line data from oiled and non-oiled areas throughout Prince William Sound, and have a predictive model that assesses the effects of oil contamination on otters, thereby providing an index to environmental health. Coupling our knowledge of otters with similar physiological data for pigeon guillemots will provide a sensitive tool for examining the health of nearshore ecosystems.

D. PROJECT DESIGN

1. Objectives

This proposal's overall goal is to identify the internal dosage of oil-related pollutants received by piscivorous birds and mammals foraging in the nearshore ecosystem of PWS, Alaska through measuring key parameters associated with biochemical toxicity. Thus, we will quantify the biochemical changes in birds and mammals inhabiting this fragile ecosystem. Guillemots and river otters will provide insight into

the pathways and effect (if any) on food webs and the long-term health of the ecosystem. The objectives of this study are to:

1) Identify guillemot nest sites and river otter latrine sites;

2) More accurately assess the effects of oil exposure. It is our intent to collect blood from guillemots and river otters in several areas of PWS to establish control areas;

3) Use blood samples from the guillemot and river otter populations to determine levels of acute phase blood proteins such as haptoglobin, albumin and metalothionine, which are indicative of exposure and tissue damage. We also will measure cytokines such as IL-1 and IL-6 and liver enzymes such as AST;

4) Supplement our molecular work by cellular studies such as red cell volume, hematocrits and immune functions (Heinz bodies will be looked for in guillemot and river otter samples);

5) Generate risk-assessments based on these biomarkers; and

6) Measure trophic level using stable isotope analysis of guillemot samples and plants and scats from river otter latrine sites.

This proposal will produce background values for selected biomarkers and allow the development of "blood associated indices" of environmental stress in mammals and birds. These indices will be useful in comparing current and future levels of petroleum hydrocarbon contamination in PWS.

2. Methodology

Pigeon Guillemots

Field studies will be conducted during the 1995, 1996, and 1997 breeding seasons in PWS, Alaska. Approximately 800 pigeon guillemots nest along the shores of Naked Island (Sanger and Cody 1993). Seventy-five active and accessible nests will be located and marked during early incubation in each of the three breeding seasons, in coordination with on-going U.S. Fish and Wildlife Service studies of guillemot reproductive success in oiled and non-oiled areas of PWS. These nests will be closely-monitored until the young fledge or the nesting attempt fails. Known-age chicks will be weighed regularly to determine individual growth rates throughout the nestling period. Blood samples (1 ml) will be collected by brachial vein puncture from each nestling at ages 20 and 30 days post-hatch (guillemot chicks normally fledge at 30-40 days post-hatch). These blood samples will be collected using SOPs developed by us during the *Exxon Valdez* spill studies to preclude sample contamination. Blood samples will be analyzed for molecular and cellular biomarkers (e.g., characteristic morphological lesions of red blood cells associated with hemolytic anemia caused by oil ingestion [Leighton 1985]). Total body fat of chicks at 20 and 30 days post-hatch will be determined by noninvasive measurement of total body electrical conductivity (Walsberg 1988). Body mass and total body fat measurements will be used to develop a condition index for each chick at 20 and 30 days post-hatch.

The impact of contaminant exposure on breeding adults will be monitored using a combination of direct and indirect methods. Attentiveness of adults will be monitored during the incubation period. Frequency of chick meal delivery and meal size will be determined during the chick-rearing period by a combination of monitoring adult nest visitation rates and periodic weighing of chicks. Individual variation in exposure of adults (and chicks) to petroleum hydrocarbons will be monitored by periodically collecting food samples from adults as they return to the nest site to feed chicks and by collecting prey samples at sea. In the lab, samples of chick food will be analyzed to determine levels of aliphatic and aromatic hydrocarbon fractions using an Iatroscan MK-5 TLC/FID Analyzer System. During the chick-brooding period (0-7 days post-hatch), adult guillemots will be captured in the nest crevice, banded for later identification, and blood samples (1 ml) collected from the brachial vein. Blood samples will be analyzed for molecular and

cellular biomarkers of contaminant exposure using the same techniques applied to chick blood samples. These measurements will allow us to monitor the impact of various levels of contaminant exposure on physiological condition of chicks and foraging efficiency of adults.

River Otters

Otters, which are relatively abundant in PWS, will be captured using Hancock live traps (Melquist and Dronkert, 1987) placed on trails at latrine sites and monitored by means of a trap transmitter (Telonics, Mesa, Arizona, USA) that signals when a trap was sprung. We have used this method successfully in the past (Duffy et al. 1993, in press). The otter initially will be immobilized in the trap with a hand injection of ketamine hydrochloride (11 mg/kg estimated body weight, Sigma, St. Louis, Missouri, USA) and placed in a drugging box (Melquist and Hornocker, 1983). Weights and measurements (see Duffy et al. 1993) will be taken and the blood sample drawn from the jugular vein. Sexes will be distinguished by the relative position of urogenital openings and palpitation of the baculum (Larson 1984). Age determinations will be based on tooth wear and overall size of otters (Stephenson 1977).

Analyses

During the past 15 years, xenobiotics have been shown to alter immune function (Sharma 1981, Fowles et al. 1993). Environmental chemicals interact with various parts of this complex system resulting in either suppression or hypersensitivity of immune activity and surveillance. A panel of biomarkers, including leukocyte counts, macrophage function, electrophoretic measurements of serum immunoglobins, and ELISA assays of interleukins will provide data on the health status of organisms and permit comparison of species.

At UAF, we will perform haptoglobin assays, IL-1 and IL-6 assays, and immunoglobin typing assays for the blood samples collected during this project. Cell counts will be performed by NBS contracted lab and macrophage function assays will be developed.

The following biomarker analyses will be performed on the samples (Fossi and Leonzio 1993): blood plasma protein and liver enzymes, cell counts and Heinz bodies, and interleukin levels. The following organism analyses will be performed for guillemots: reproductive success, nest and site abandonment, trophic level using stable isotope ratios of guillemot tissues and prey

In the area of data analysis and interpretation, we plan on linking our data with the results on sea otters and nearshore invertebrates in PWS. Proposed studies on invertebrates, sea otters, and ours on guillemots and river otters in PWS gives these studies a holistic ecosystem approach. All data from this study will become public information. The data will be forwarded to the EVOS Trustee Council in journal format for archiving. Also, the data will be available to the public through the use of peer reviewed journals. Any different format will be mutually agreed to.

3. Schedule

Field work in Prince William Sound will be conducted during spring and summer 1995, 1996, and 1997. Data collection during three field seasons will be necessary to provide minimal information on interannual variation in reproductive success and blood chemistry of guillemots and morphometrics and blood chemistry of river otters. Guillemots normally lay eggs from late May to late June and raise their young during July and early August. Active, accessible nests of the study species will be located and marked early in the incubation period during late May and early June. Marked nests will be checked daily during the hatching period to determine hatching date, and chicks will be banded soon after hatching so that individual growth rates can be monitored throughout the nestling period. Blood samples from chicks will be collected throughout the nestling period. Chicks will be monitored throughout the nestling period to determine growth rates, fledgling age and mass, and survival until fledging. River otters are most easily live-trapped in late April and early May; we will concentrate our efforts during this period.

Following the field season, guillemot and river otter blood samples will be analyzed in the lab. These analyses will be completed before the next field season to determine the results prior to collecting addition samples from the field. A draft annual report will be prepared in April and a final report will be submitted

in June. Following the analysis of samples collected during the 1997 field season, data collected during the three field seasons will be analyzed by May 1998 for relationships between blood bioindicators and reproductive success for guillemots, and between morphometrics and blood chemistry for otters (see Duffy et al. 1993, 1994, in press). The results of these analyses will be prepared in manuscript form and submitted by the end of FY 1998.

4. Technical Support

Laboratory analyses of the blood chemistry of guillemots and river otters will be conducted in the laboratory of the Co-PI (LKD). Standard blood clinical panel and ELISA analyses of oil on pelage and plumage will be subcontracted to other laboratories. No new laboratory equipment will need to be purchased for the proposed research with funds provided by the grant. A laboratory technician will be employed to help the Co-PI and graduate research assistant with IG and HP analyses in blood, and with performing of routine laboratory analyses.

5. Location

The proposed field work will be conducted in PWS. PWS supports accessible breeding population of guillemots that are more than adequate for the proposed research. Field work on guillemots will be conducted at breeding colonies on Naked Island, Fool Island, and Jackpot Island. Approximately 800 pigeon guillemots nest along the shores of Naked Island (Sanger and Cody 1993). The Naked Island base camp would offer an ideal base for field studies on guillemots (D. Irons, pers. comm.), and Naked Island supports the highest breeding densities of guillemots in PWS (Sanger and Cody 1993). Fool Island has approximately 80 guillemot nests and Jackpot Island has about 60 guillemot nests and pairs are breeding at high densities in both sites (G. Sanger, pers. comm.). Naked Island also supports high densities of river otters, and we already have baseline data for otters on Naked Island and northern Knight Island.

The at-sea foraging distribution of pigeon guillemots near Naked Island, Fool Island, and Jackpot Island has been the subject of previous study (Sanger and Cody 1993), as has the species composition of the diet (Kuletz 1983). A field camp operated by the U.S. Fish and Wildlife Service is available for field workers on Naked Island and is within walking distance of colonies where adequate numbers of accessible guillemot nests are available.

E. PROJECT IMPLEMENTATION

The proposed research will be implemented by the University of Alaska Fairbanks, with assistance from and in cooperation with U.S. Fish and Wildlife Service and Alaska Department of Fish and Game biologists with expertise on the proposed study species in the proposed study area. The PI (D. D. Roby) has extensive experience with studies of the reproductive biology of high latitude seabirds and the relationship between nestling growth and productivity. L. K. Duffy has extensive experience conducting blood analyses, including previous oil spill research. R. T. Bowyer has developed and published a habitat model that will help insure the capture of river otters (by trapping in the most productive areas) and has numerous other publications on river otters. The PI and Co-PI (LKD) currently have in their laboratories the analytical equipment necessary to accomplish the proposed laboratory analyses and they are familiar with the relevant analytical procedures. To the PIs' knowledge, the expertise and equipment necessary for the proposed research are not available within the federal and state agencies that compose the Trustees Council. The PIs will be assisted by a Graduate Research Assistant (Ph.D. candidate), Field Technicians, and undergraduate field assistants who will be carefully selected from the applicant pool as qualified to participate in the proposed research.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

The research described in this proposal dove-tails nicely with on-going research to assess factors limiting recovery of seabird and mammal populations damaged by EVOS. It is also relevant to efforts toward developing seabird and mammal models as upper trophic level sentinels of contaminants and changes in the availability of fish for vertebrate predators. The proposed research approach utilizes biomarkers to help identify and quantify the health of vertebrate predators within the PWS ecosystem. This approach is necessary because of the extreme complexity of assessing contaminant exposure due to temporal and spatial variability and unpredictability in PWS.

Cooperators include Dr. David Irons of the Migratory Bird Branch, U.S. Fish and Wildlife Service. Dr. Irons has had extensive experience working in the field with both guillemots nesting in PWS, and is project leader for on-going studies of the reproductive success and status of these two species in PWS. Close coordination with Dr. Irons' research teams at Naked Island will be essential for the success of the proposed research.

G. PUBLIC PROCESS

The ideas, methods, and scope of work encompassed in this proposal were introduced and refined at both the April 1994 EVOS restoration planning workshop and at a follow-up meeting of public and government representatives interested in nearshore ecosystem research. Similar opportunities for public input will be available on an annual basis, including two winter workshops sponsored by the Exxon Valdez Spill Restoration Office.

All the data generated during the proposed study will be duplicated, with one copy each remaining in the permanent files of the PI and Co-PIs at the University of Alaska Fairbanks, and an additional copy will be retained by the Graduate Research Assistant. The Exxon Valdez Trustees Council Restoration Office and any other interested scientist, organization, or agency will be supplied with copies of any reports, thesis, or publications that result from the proposed research. The results of the proposed study will be part of the dissertation of the Graduate Research Assistant.

Quarterly reports and annual reports will be provided to the Trustees Council (1 abstract 1996, 1 paper 1997). We will provide baseline data on certain biomarkers in guillemots and river otters. We will further test a predictive models developed during earlier *Exxon Valdez* oil spill studies that already are established for otters (and other mammals) and develop baselines for guillemots (1 paper 1998). Graduate students and undergraduates will gain field and laboratory experience.

H. PERSONNEL QUALIFICATIONS

Please see attached CVs of the PI and Co-PIs.

LITERATURE CITED

Asbirk, S. 1979. The adaptive significance of the reproductive pattern in the black guillemot, *Cepphus grylle*. Vidensk. Meddr. dansk naturh. Foren. 141:29-80.

Baker, J. R., A. M. Jones, T. P. Jones, and H. C. Watson. 1981. Otter *Lutra lutra* mortality and marine pollution. Biological Conservation 20:311-321.

Bowyer, R. T., J. W. Testa, J. B. Faro, C.C. Schwartz, J.B. Browning. in press. Changes in diets of river otters in Prince William Sound, Alaska: effects of the *Exxon Valdez* oil spill. Can. J. Zool.

Docktor, C.M., R.T. Bowyer and A.G. Clark. 1987. Number of Corpora Lutea as related to age and distribution of river otters in Maine. J. Mammal. 68:182-185.

Drent, R.H. 1965. Breeding biology of the pigeon guillemot, *Cepphus columba*. Ardea 53:99-159.

Dubuc, L.C., W.B. Krohn and R.B. Owen, Jr. 1990. Predicting occurrences of river otters by habitat on Mount Desert Island, Maine. J. Wildl. Manage. 54:594-599.

Duffy, L.K., R.T. Bowyer, J.W. Testa and J.B. Faro. 1993. Differences in blood haptoglobin and length-mass relationships in river otters (*Lutra canadensis*) from oiled and nonoiled areas of Prince William Sound, Alaska. J. Wildl. Dis. 29:353-359.

Duffy, L.K., R.T. Bowyer, J.W. Testa and J.B. Faro. 1994. Chronic effects of the *Exxon Valdez* oil spill on blood and enzyme chemistry of river otters. Environ. Toxicol. Chem. in press.

Duffy, L.K., R.T. Bowyer, J.W. Testa and J.B. Faro. In press. Evidence for recovery of body mass and haptoglobin values of river otters following the *Exxon Valdez* oil spill. J Wildl. Diseases.

Duffy, L.K., R.T. Bowyer, J.W. Testa and J.B. Faro. In press (a). Habitat selection and home ranges of river otters in a marine environment: Effects of the *Exxon Valdez* oil spill. J. Mammalogy.

Fossi, J. C., and C. Leonzio (eds.). 1993. Nondestructive biomarkers in vertebrates. Lewis Publ., Boca Raton, FL. 345 pp.

Fowles, J. R., A. Bairbrother, M. Fix, S. Schelder, and N. I. Kerkobet. 1993. Glucocorticoid effects on natural and humoral immunity in mallards. Dev. Comp. Immunol. 17:165-175.

Fry, D.M. and L.J. Lowenstine. 1985. Pathology of common murres and cossin's auklets exposed to oil. Arch. Environ. Contam. Toxicol. 14:725-737.

Hall, R.J. and N.C. Coon. 1988. Interpreting residues of petroleum hydrocarbons in wildlife tissues. U.S. Fish Wildl. Serv., Biol. Rep. 88(15). 8pp.

Hill, J., and P. A. Tumoi. 1990. Field test for detecting crude oil on the fur of sea otters. U.S. Fish and Wildl. Serv., Biol. Rept. 90:95-122.

Klosiewski, S. P., and K. K. Laing. ms. Marine bird populations of Prince William Sound, Alaska, before and after the *Exxon Valdez* oil spill. Bird Study No. 2. Final Report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.

Kruuk, H., A. Morehouse, J. N. H. Conroy, L. Durbin, and S. Fears. 1984. An estimate of numbers and habitat preferences of otters *Lutra lutra* in Shetland, U.K. Biological Conservation 49:241-254.

Kruuk, H., J. N. H. Conroy, and A. Morehouse. 1989. Recruitment to a population of otters (Lutra lutra) in Shetland, in relation to fish abundance. J. Applied Ecology 28:95-101.

Kuletz, K. J. 1983. Mechanisms and consequences of foraging behavior in a population of breeding pigeon guillemots. M.S. Thesis, Univ. of California, Irvine. 79 pp.

Larsen, D.N. 1984. Feeding habits of river otters in coastal southeastern Alaska. J. Wildl. Manage. 48:1446-1452.

Lee, Y.-Z., F.A. Leighton, D.B. Peakall, R.J. Norstrom, P.J. O'Brien, J.F. Payne and A.D. Rahimtula. 1985. Effects of ingestion of Hibernia and Prudhoe Bay crude oils on hepatic and renal mixed function oxidase in nestling herring fulls (*Larus argentatus*). Environ. Res. 36:248-255.

Lee, Y.-Z., P.J. O'Brien, J.F. Payne and A.D. Rahimtula. 1986. Toxicity of petroleum crude oils and their effect on xenobiotic metabolizing enzyme activities in the chicken embryo *in ovo*. Environ. Res. 39:153-163.

Leighton, F.A. 1985. Morphological lesions in red blood cells from herring fulls and Atlantic puffins ingesting Prudhoe Bay crude oil. Vet. Pathol. 22:393-402.

Melquist, W.E. and M.G. Hornocker. 1983. Ecology of river otters in West Central Idaho. Wildl. Monogr. 83:1-60.

Miller, D.S., D.B. Peakall and W.B. Kinter. 1978. Ingestion of crude oil: Sublethal effects in herring full chicks. Science 199:315-317.

Oakley, K. 1981. Determinants of the population size and distribution of the pigeon guillemot (*Cepphus columba*) at Naked Island, Prince William Sound, Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks. 65 pp.

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

Payne, J.F., L.L. Fancey, A.D. Rahimtula and E.L. Porter. 1987. Review and perspective on the use of mixed-function oxygenase enzymes in biological monitoring. Comp. Biochem. Physiol. 86C:233-245.

Peakall, D.B., D. Hallett, D.S. Miller, R.G. Butler, and W.B. Kinter. 1980. Effects of ingested crude oil on Black Guillemots: a combined field and laboratory study. Ambio 9: 28-30.

Peakall, D.B., D.J. Hallett, J.R. Bend and G.L. Foureman. 1982. Toxicity of Prudhoe Bay crude oil and its aromatic fractions to nestling herring gulls. Environ. Res. 27:206-215.

Peakall, D.B., R.J. Norstrom, A.D. Rahimtula and R.D. Butler. 1986. Characterization of mixed-function oxidase systems of the nestling herring gull and its implications for bioeffects monitoring. Envir. Tox. Chem. 5:379-385.

Perrollaz, D. C., and J. A. Rash. 1990. Analysis of sea otter fur for crude oil contamination. Symposium to evaluate the response effort on behalf of sea otters after the J/V Exxon Valdez oil spill into Prince William Sound. U.S. Fish and Wildlife Service, Biol. Rept. 90:123.

Sanger, G. A., and M. B. Cody. 1993. Survey of Pigeon Guillemot colonies in Prince William Sound, Alaska. Draft Final Report, Restoration Project 93034, U.S. Fish and Wildlife Service, Anchorage, AK.

Sowls, A.L., S.A. Hatch, and C.J. Lensink. 1978. Catalog of Alaska seabird colonies. U.S. Fish & Wildl. Serv., Biol. Serv. Prog. 78/78.

Stenson, G. B., G. A. Badgero, and H. D. Fisher. 1984. Food habits of the river otter *Lutra canadens*. in the marine environment of British Columbia. Can. J. Zool. 62:88-91.

Stephenson, A.B. 1977. Age determination and morphological variation of Ontario otters. Can. J. Zool. 55:1577-1583.

Testa, J.W., D.F. Holleman, R.T. Bowyer and J.B. Faro. in press. Estimating marine river otter populations in Prince William Sound, Alaska using radiotracer implants. J. Mammal.

Walsberg, G.E. 1988. Evaluation of a nondestructive method for determining fat stores in small birds and mammals. Physiol. Zool. 61:153-159.

Woolington, J.D. 1984. Habitat use and movements of river otters at Kelp Bay, Baronof Island, Alaska. M.S. Thesis, University of Alaska Fairbanks, 147 pp.

Wren, C.D. 1984. Distribution of metals in tissues of beaver, raccoon and otter from Ontario, Canada. Sci. Total Environ. 34:177-184.

Wren, C.D. 1985. Probable cause of mercury poisoning in a wild otter, *Lutra canadensis*, in Northwestern Ontario. Can. Field. Nat. 99:112-114.

Wren, C.D., H. MacCrimmon, R. Frank and P. Suda. 1980. Total and methylmercury levels in wild mammals from the precambrian shield area of South Central Ontario, Canada. Bull. Environ. Contam. Toxicol. 25:100:105.

Zenteno-Savin, T., M.A. Castellini and L.K. Duffy. Haptoglobin concentration in plasma from Stellar sea lions at Forrester Island and the Aleutian Islands. Marine Mammal Meeting, Galveston, TX, Oct. 1993.

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Director, G.C.M. Wildlife Research Center, Mumford, New York, 1986-1988
Adjunct Assistant Professor of Biology, University of Rochester, New York, 1986-1988
Doctoral dissertation research, University of Pennsylvania, Philadelphia. 1980-1985, Thesis title: Diet and reproduction in high latitude plankton-feeding seabirds.
Wildlife Biologist, Alaska Department of Fish and Game, Fairbanks, Alaska, 1979
Research Associate, Alaska Cooperative Wildlife Research Unit, University of Alaska, 1978
Visiting Research Biologist, Greenland Caribou Project, Danish Wildlife Research Institute, Kak 1977
Masters thesis research, University of Alaska, Fairbanks, 1974-1976, Thesis title: Behavioral patterns of barren-ground caribou of the Central Arctic Herd adjacent to the Trans-Alaska Pipeline

Competitive Awards and Grants:

1994-95 Equipment Grant, Multi-user Biological Equipment Program, National Science Foundation
1994-95 Research Grant, Coastal Marine Institute and Minerals Management Service
1993-94 Research Grant, Angus Gavin Migratory Bird Research Fund
1993-94 Research Award, President's Special Projects Fund, University of Alaska

1991-93 Research Grant, Division of Polar Programs, National Science Foundation (USA)
1989-90 Special Research Award, Office of Research Development Administration, Southern Illinois University
1985 N.A.T.O. Post-doctoral Research Fellowship
1983-85 Shell Foundation Research Fellowship
1978 Research Grant, The Arctic Institute of North America
1977-78 Research Scholarship, Danish George C. Marshall Memorial Fund
1974-77 Research Fellowship, Alaska Cooperative Wildlife Research Unit

Selected Recent Refereed Publications:

1993 Physiological aspects of stomach oil formation in Antarctic seabirds. (with J. R. E. Taylor and A. R. Place) Antarct. J. (U.S.) 28(5): 000-000.
1993 Factors limiting fecundity of captive Brown-headed Cowbirds. (with K.C. Holford, senior author). Condor 95: 536-545.
1992 Investigations of the adaptive role of stomach oils in seabird reproduction. (with J.R.E. Taylor and A.R. Place) Antarct. J. (U. S.) 27(5): 147-148.
1992 Effects of bird blowfly parasitism on Eastern Bluebird and Tree Swallow nestlings. (with K.L. Brink and K. Wittmann). Wilson Bull. 104: 630-643.
1992 Fecundity and egg-laying patterns of captive yearling Brown-headed Cowbirds. (with N.H. Jackson, senior author). Condor 94: 585-589.
1991 A comparison of two noninvasive techniques for measuring total body lipid in live birds. Auk 108: 509-518.
1991 Diet and postnatal energetics in two convergent taxa of plankton-feeding seabirds. Auk 108: 131-146.
1989 Relative passage rates of lipid and aqueous digesta in the formation of stomach oils. (with K.L. Brink and A.R. Place). Auk 106: 303-313.
1989 Chick feeding in the diving petrels Pelecanoides georgicus and P. urinatrix exsul. Antarctic Science 1: 337-342.
1989 [Review of] The Greenland caribou - zoogeography, taxonomy, and population dynamics, by M. Meldgaard. Meddelelser om Grønland, Bioscience 20, Copenhagen. J. Wildl. Manage. 53: 509-511.
1987 Comparative antler morphology and size of North American moose. (with W.C. Gasaway, D.J. Preston, and D.J. Reed, senior authors). Swed. Wildl. Res., Suppl. 1: 311-325.
1986 Assimilation and deposition of wax esters in planktivorous seabirds. (with A.R. Place and R.E. Ricklefs). J. Exp. Zool. 238: 29-41.
1986 Energy expenditure in adult least auklets and diving petrels during the chick-rearing period. (with R.E. Ricklefs). Physiol. Zool. 59: 661-678.
1986 Daily energy expenditure by adult Leach's storm-petrels during the nesting cycle. (with R.E. Ricklefs, senior author, and J.B. Williams). Physiol. Zool. 59: 649-660.
1986 Breeding biology of least auklets on the Pribilof Islands, Alaska. (with K.L. Brink). Condor. 88: 336-346.
1986 Decline of least auklets on the Pribilof Islands, Alaska. (with K.L. Brink). J. Field Ornith. 57: 57-59.
1986 Assimilation and deposition of dietary fatty alcohols in Leach's storm-petrel, Oceanodroma leucorhoa. (with A.R. Place, senior author). J. Exp. Zool. 240: 149-161
1986 Notes on petrels (Procellariiformes) breeding on Ardley Island, South Shetland Islands (with M. Sallaberry A. and K.L. Brink). Ser. Cient. INACH 34: 67-72.
1985 Behaviour of west Greenland caribou during a population decline. (with H. Thing). Holarct. Ecology 8: 77-87.
1984 History, status, and taxonomic identity of caribou (Rangifer tarandus) in northwest Greenland. (with H. Thing and K.L. Brink). Arctic 37: 23-30.

1984 Observations on the cooling tolerance of the embryos of the diving petrel Pelecanu georgicus. (with R.E. Ricklefs). Auk 101: 160-161.

1983 Some aspects of the breeding biology of the diving petrels Pelecanoides georgicus a P. urinatrix exsul at Bird Island, South Georgia. (with R.E. Ricklefs). Br. Antarct. Surv. Bull. No. 58: 29-38.

1983 Development of homeothermy in the diving petrels Pelecanoides urinatrix exsul and P. georgicus and the antarctic prion Pachyptila desolata. (with R.E. Ricklefs, senior author). Comp. Biochem. Physiol. 75: 307-311

1983 The size, organic composition, and energy content of Leach's storm-petrel eggs with regard to position in the precocial/altricial spectrum. (with W.A. Montevecchi, I. Kirkham, senior authors, and K.L. Brink). Can. J. Zool. 61: 1456-1463.

Professional Organizations and Service:

Member - American Association for the Advancement of Science
Member - American Ornithologists' Union
Member - Cooper Ornithological Society
Member - The Wildlife Society
Appointed Delegate - from the American Ornithologists' Union to the International Council for Bird Preservation (ICBP), U.S. Section
Peer Reviewer - Restoration Science, Oil Spill Restoration Work Group, Alaska Department of Fish and Game and U.S. Environmental Protection Agency
Regular Reviewer of Manuscripts - Auk, Condor, Journal of Wildlife Management, Animal Behaviour, Arctic
Co-convenor - Symposium on Avian Energetics and Nutritional Ecology, 111th Annual Meeting of the American Ornithologists' Union, 1993.
Member - Committee on Local Arrangements, 111th Annual Meeting of the Ameri Ornithologists' Union, Fairbanks, AK.

Certifications:

Certified Wildlife Biologist - The Wildlife Society

BIOGRAPHICAL SKETCH

Dr. Lawrence K. Duffy
Professor of Chemistry and Biochemistry

Birthday:

1 February 1948

Education:

Fordham University, Bronx, NY. B.S., 1969, Chemistry
University of Alaska Fairbanks, Fairbanks, AK, M.S., 1971, Organic Chemistry
University of Alaska Fairbanks, Fairbanks, AK, Ph.D., 1977, Biochemistry

Professional Experience:

1971-73	Lieutenant, U.S. Navy
1977-78	Postdoctoral Fellow, Boston University, with Dr. R. A. Laursen. Research: Structure of EF-TU
1978-80	Postdoctoral Fellow, Department of Physiological Chemistry, Roche Institute of Molecular Biology, Nutley, NJ, with Dr. C. Y. Lai
1980-81	James W. McLaughlin Fellow, Department of Human Biological Chemistry and Genetics, University of Texas Medical Branch, Galveston
1981-82	Research Assistant Professor, Department of Human Biological Chemistry and Genetics, University of Texas Medical Branch, Galveston
1983-87	Assistant Professor of Biochemistry/Neurology, Harvard Medical School, Boston
1987-91	Associate Professor of Chemistry and Biochemistry and Coordinator, Program in Biochemistry and Molecular Biology, University of Alaska Fairbanks, Fairbanks, AK
1991 - present	Professor of Chemistry and Biochemistry, University of Alaska Fairbanks, Fairbanks, AK

Honors and Awards:

ACS Analytical Chemistry Award, Fordham University, 1969
NSF Summer Traineeship, Department of Chemistry, University of Alaska Fairbanks, 1971
J. W. McLaughlin Fellow, University of Texas Medical Branch, Galveston, 1980-81
W. F. Milton Scholar, Harvard University, 1983
Alzheimer Disease and Related Disorders' Association Faculty Scholar Award, 1987
Vice-President Board of Directors, Alzheimer's Disease Association of Alaska, 1993.
UAF's Carol Fiest Undergraduate Advising Award, 1993-94.

Bibliography:

Segal, A. and Duffy, L. K. 1992. Ethanol elimination among different racial groups. Alcohol: Clinical and Exp. Res. 9:213-217.

Borgese, T. A., Harrington, J. P., Duffy, L. K and Bourke, S. 1992. Function studies on goosefish hemoglobin. Comp. Biochem. Physiol. 101B:535-539.

Zhao, X., Valantas, J.A., Vyas, S. and Duffy, L. K 1993. Comparative toxicity of amyloid ß-peptides in neuroblastoma cell lines: Effects of albumin and physalaemin. Comp. Biochem. Physiol. 106C:165-170.

Zhao, X., Schoenheit, C. and Duffy, L. K. 1991. A Heparin-Binding protein from veuroblastoma cells: Immunological comparison to ß amyloid precursor protein, Comp. Biochem. Physiol. 100A(3):715-718.

Kowall, N.W., Beal, M.F., Busciglio, J., Duffy, L.K and Yankner, B.A. 1991. An *in vivo* model for the neuro-degenerative effects of ß amyloid and protection by substance P. Proc. Natl. Acad. Sci (USA) 88:7247-7251.

Duffy, L. K and Segal, B. 1991. Haptoglobin levels among alcoholics in Alaska. Arct. Med. Res., 50:166-169.

Zhao, X and Duffy, L.K. 1991. On the interaction of a synthetic amyloid ß-peptide with NB41A3 cells. Neurosci. Res. Comm. 9:159-166.

Duffy, L.K., Bowyer, R.T., Testa, J.W. and Faro, J.B. 1993. Chronic effects of the *Exxon Valdez* oil spill on blood and enzyme chemistry of river otters. Environ. Toxicol. Chem. 13:643-647.

Duffy, L.K., Testa J. W., Bowyer, R. T. and Faro, J. B. 1993. Differences in blood haptoglobin and length-mass relationships in river otter (Luttra canadensis) from oiled and nonoiled areas of PWS. J. Wildlife Dis. 29:353-359.

Levine, M.E., Milliron, A.N. and Duffy, L.K. 1994. Dirunal and seasonal rhythms of melatonin, cortisol and testosterone in interior Alaska. Arct. Med. Res. 53:25-34.

Avksentyuk, A.V., Kurilovich, S.A., Duffy, L.K., Segal B., Voevoda, M.I. and Nikitin, Y.P. Alcohol consumption and flushing response in Chukotka. Journal of Studies on Alcohol, in press.

Duffy, L.K. 1993. Oxyfuel in Alaska: Use of interleukins to monitor effects on the immune system. Sci Total. Environ., in press.

Duffy, L.K., Bowyer, R.T., Testa, F.W. and Faro, J.B. 1994. Evidence for recovery of body mass and haptoglobin values of river otters following the *Exxon Valdez* oil spill. J. Wildlife Dis. in press.

Danilenko, K.V., Putilov, A.A., Russkikh, G.S., Duffy, L.K., Barnes, B.M. and Ebbesson, S.O.E. 1994. Diurnal and seasonal variations of melatonin and serotonin in women with seasonal affective disorder. Arct. Med. Res. in press.

Yankner. B.A., Caceres, A. and Duffy, Lawrence K. 1990. Nerve growth factor potentiates amyloid toxicity, Proc. Natl. Acad. Sci. USA, 87:9020-9023.

Segal, B., Duffy, L.K., Kurilovitch, Sa.A., & Avksentyuk, A.V. May, 1990. Alaskan and Siberian studies on alcoholic behavior and genetic predisposition. Paper presented at the 8th International Congress on Circumpolar Health, Whitehorse, Yukon, Canada.

Yankner, B.A., Duffy, L.K., and Kirschner, D.A. 1990. Neurotrophic and neurotoxic effects of beta-amyloid: Reversal by tachykinin neuropeptides, Science 250:279-282.

Kirschner, D.A., Duffy, L.K., Fraser, P.E., O'Malley, J.D., Nguyen, J. and Inouye, H. 1990. Morphology and antibody recognition of synthetic beta-amyloid peptides.

Selkoe, D.J., Duffy, L.K., Nukina, N., Podlisny, M.B., Abraham, C. and Kosik, K.S. 1989. Molecular pathology of intra and extraneuronal filaments in brain aging and Alzheimer's disease. In Familial Alzheimer's Disease (Miner, G.D., Richter, R.W., Blass, J.P. and Winters-Miner, L.A., Eds.) Marcel Dekker, Inc., NY, pp. 137-151.

Joachim, L.L., Duffy, L.K., Morris, J.H., and Selkoe, D.J. 1988. Protein chemical and immunocytochemical studies of meningovascular beta-amyloid in Alzheimer's disease and normal aging. Brain Res. 474:100-111.

Kosik, K.S., Orecchio, L.D., Bakalis, S., Duffy, L.K., and Neve, R.L. 1988. MAP2: The microtubile-binding domain, potential phosphoRylation sites and Alzheimer neurofibillary tangle epitope, J. Neurochem. 51:587-598.

Chapman, H.A., Ehrhardt, M.M., Grombie, G., and Duffy, L.K. 1988. Assay of extracellular matrix elastin degradation based on cation exchange HPLC determined release of tritiated desmosine and isodesmosine, J. Biochem. Biophys. Meth. 15:283-290.

Roth, M.M., Drovin, G.L., and Duffy, L.K. 1987. Isolation of human ferrochelai. Arch. Dermat. 123:429-430.

Kirschner, D.A., Inouye, H., Duffy, L.K., Sinclari, A., Lind, M., and Selkoe, D.J. 1987. Synthetic beta-peptide of Alzheimer disease forms amyloid-like fibrils in vitro. Proc. Nat. Acad. Sci. 84:6953-6957.

Selkoe, D.J., Duffy, L.K., Nukina, N., Joachim, C.L. Podlisny, M.B., and Kosik, K.S. (1987). Biochemical analysis of mayloid filaments and paired helical filaments and thier respective contributions to neuronal degeneration. In Banbury Reports 27: Molecular Neuropathology of Aging, pp. 235-252.

Duffy, L.K., Kirschner, D.A., Joachim, C.L., Sinclair, A., Inouye, H., and Selkoe, D.J. 1987. Comparison of amyloid from AD with synthetic paptide in peptides, Chemistry and Biology, (Marshall, G.R. ed.) Escom Science Pub. Netherlands, pp. 604-607.

Duffy, L.K., Rassol, C.G., Walsh, R.L., Podlisny, M.B., and Selkoe, D.J. 1987. Studies on the relationship between plasma proteins and amyloid fibers found in Alzheimer's disease. Ann. N.Y. Acad. Sci., 529:233-235.

CURRICULUM VITAE

R. TERRY BOWYER

EDUCATION:

Ph.D., 1985, The University of Michigan, Natural Resources
M.S., 1976, Humboldt State University, Wildlife Management
B.S., 1970, Humboldt State Univ., Wildlife Management, Biology Minor

EXPERIENCE:

Professor of Wildlife Ecology, University of Alaska Fairbanks, 1994-present.
Tenured Associate Professor of Wildlife Ecology, University of Alaska Fairbanks, 1988-present
Assistant Professor of Wildlife Ecology, University of Alaska Fairbanks, 1986-1988
Assistant Professor of Wildlife Science, Unity College in Maine, 1980-1986
Visiting Assistant Professor of Biology, Mountain Lake Biological Station, University of Virginia, 1985
California State Park Ranger (P.I.),1968-1974

OTHER ACTIVITIES:

Associate Editor, *Journal of Mammalogy*, 1991-present
Editor, *Muskox Husbandry* by P. Groves. Alaska Biological papers, 1991
Associate Editor, *The Wildlife Society Bulletin*, 1988-1989
Associate Editor, *Desert Bighorn Council Transactions*,1987-1988
President:
Alaska Chapter of the Wildlife Society (1989-1990);
Maine Chapter of the Wildlife Society (1983-1984); and
Ann Arbor Chapter of the Wildlife Society (1977-1978).

SELECTED PUBLICATIONS ON CARNIVORES (46 TOTAL PUBLICATIONS):

Testa, J.W., D.F. Holleman, R.T. Bowyer, and J.B. Faro. In press. Estimating marine river otter populations in Prince William Sound, Alaska using radiotracer implants. J. Mammal.

Bowyer, R.T., J.W. Testa, J.B. Faro, C.C. Schwartz and J.B. Browning. In press. Changes in diets of river otters in Prince William Sound, Alaska: effects of the *Exxon Valdez* oil spill. Can. J. Zool.

Duffy, L.K., R.T. Bowyer, J.W. Testa and J.B. Faro. In press. Chronic effects of the *Exxon Valdez* oil spill on blood and enzyme chemistry of river otters. Environ. Toxicol. Chem.

Dale, B.W., L.G. Adams, and R.T. Bowyer. In press. Winter wolf predation in a multiple ungulate prey system, Gates of the Arctic National Park, Alaska. Can. J. Zool.

Duffy, L.K., R.T. Bowyer, J.W. Testa, and J.B. Faro. 1993. Differences in blood haptoglobin and length-mass relationships in river otters (*Lutra canadensis*) from oiled and nonoiled areas of Prince William Sound, Alaska. J. Wildl. Dis. 92:353-369.

Bowyer, R.T. 1987. Coyote group size relative to predation on mule deer. Mammalia 51:515-526.

Docktor, C.M., R.T. Bowyer, and A.G. Clark. 1987. Number of corpora lutea as related to river otter age and distribution in Maine. J. Mammal. 68:182-185.

Jenks, J.A., A.G. Clark and R.T. Bowyer. 1986. Sex and age determination for fisher using radiographs of canine teeth: a response. J. Wildl. Manage. 50:277-278.

Shea, M.E., N.L. Rollins, R.T. Bowyer, and A. Clark. 1985. Fisher corpora lutea as related to age and distribution in Maine. J. Wildl. Manage. 49:37-40.

Jenks, J.A., R.T. Bowyer and A.G. Clark. 1984. Sex and age class determination for fisher using radiographs of canine teeth. J. Wild. Mange. 48:626-628.

GRADUATE STUDENT SUPERVISION: 1991 - Present (Chair of Committee)
Graduated: 2 Ph.D., 4 M.S. students
Current: 5 Ph.D., 4 M.S. students

1989 - Present (Committee Member)
Graduated: 2 Ph.D., 9 M.S. students
Current: 7 Ph.D., 8 M.S. students

SELECTED GRANTS:

1992 - Spatial Organization and Feeding Ecology of the Alexander Archipelago Wolf. Alaska Dept. Fish and Game, $75,000.

1989-1991 - Effects of the *Exxon Valdez* Oil Spill on River Otters in Prince William Sound. Wildlife Assessment Program, $180,000.

Project Title Relation of clam population structure to recovery of injured nearshore vertebrate predators [A component project of: Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound (NVP)]

Project # 95025G, 95094 (now combined as one project) Revised 8/3/94

Proposed By (co-principal investigators, listed alphabetically)

Stephen C. Jewett
Institute of Marine Science
University of Alaska Fairbanks

Glenn R. VanBlaricom
Washington Cooperative Fish and Wildlife Research Unit
Division of Cooperative Research
National Biological Survey

Lead Trustee Agency National Biological Survey

Cooperating Agency Alaska Department of Fish and Game

Cost FY 95
Intertidal component: 88,868
Subtidal component: 121,300
Total, FY 95: 210,168

Cost FY 96
Intertidal component: 140,316
Subtidal component: 134,950
Total, FY 96: 275,266

Cost Total
Intertidal component: 621,719
Subtidal component: 522,700
Project total: 1,144,419

Duration 5 years (1 Apr 95 - 30 Sept 99)

Geographic Area Central and western Prince William Sound

Injured Resources Sea otters, clams

Injured Services Subsistence use of clams

Contact Person:
Leslie Holland-Bartels
Alaska Research Center
National Biological Survey
1011 East Tudor Road
Anchorage, Alaska 99503
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B. INTRODUCTION

This project is one component of an integrated ecosystem-scale program entitled "Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound" (NVP). The NVP Program will assess predator-prey relationships in order to understand recovery patterns of significant vertebrate predators injured by the Exxon Valdez oil spill (EVOS) in Prince William Sound (PWS). As noted in the Program umbrella document, the NVP Program will utilize invertebrate prey populations as indicators of predator population density. Because of the important effects of sea otters on benthic ecosystems, abundance and size structure of significant prey should provide information on the recovery status of sea otter populations.

This project examines the status and dynamics of populations of clams, the primary prey for sea otters in PWS, in an effort to better assess the recovery status of sea otters, and to find explanations for an apparent failure of sea otters in some areas to recover from EVOS. Like sea otters, clams are a biological resource injured by EVOS. Patterns of recovery in clam populations are unknown. Two hypotheses will be evaluated:

(1) Clam population status reflects the recovery status of sea otter populations in PWS. Clam abundance and availability in areas with damaged sea otter populations will be greater than in areas with recovered sea otter populations.

(2) Damage to clam populations has contributed to the failure of sea otter populations to recover from EVOS. Damaged sea otter populations are not recovering because damaged clam resources are not recovering.

Inadequate post-EVOS recruitment of clams may be constraining recovery of injured clam and sea otter populations. Dynamics of clam populations often are influenced substantially by patterns of recruitment. Intensity of recruitment in clams may vary significantly among years, and there may be some years in which recruitment does not occur. Such variations will have important consequences for species that depend on clams for food.

Although the NVP Program focuses on injured populations of vertebrate predators, our component project will, in addition, provide useful information regarding EVOS damage to subsistence use of clams. Prior to EVOS, clams were an important subsistence food at numerous locations in PWS. EVOS damage has limited subsistence use of intertidal clam resources.

This project will be effective in achieving stated goals if it is pursued over several years. However, limitation of work to FY-95 will provide information of significant value to the EVOS Restoration Program.

C. NEED FOR THE PROJECT

This component of the NVP Program will contribute to the ability of resource managers to understand if sea otters and clams are recovering from EVOS, and if not why not, and will allow resource managers and decision makers to use ecosystem-scale data to select appropriate restoration options for sea otters and clams in PWS.

Our project will address four important issues regarding the restoration of sea otter and clam

populations in PWS:

(1) Are clam populations different in areas where sea otter populations were reduced by EVOS, compared to areas in which sea otters were not reduced? This is a specific application of hypothesis H_{01} as defined in the NVP Program umbrella document. Does the pattern of difference indicate a causal relationship with injury to sea otter populations?

(2) Are injured clam resources recovering? Clam populations are recognized as an injured resource, but recovery trends are unknown. Documentation of abundance, size structure, and recruitment patterns will provide useful information for determination of population dynamics for clams.

(3) What factors are constraining injured resources from recovering? Clams are the most important source of nutrition for sea otters in PWS. If current and recently past patterns of abundance, demography, and recruitment are contributing to low productivity in clam populations, sea otters may be suffering a consequent inability to recover effectively from EVOS damage.

(4) How do patterns of clam abundance, size distribution, and recruitment influence subsistence clam resources in certain portions of the PWS region? An improved understanding of demographic and recruitment effects on clam availability will contribute to more judicious management of clam resources for human use during the recovery period.

D. PROJECT DESIGN

1. Objectives:

The NVP Program will use an integrated, rigorously-managed ecosystem approach to understand why populations of nearshore vertebrate predators are not recovering from EVOS damage. Our component project will determine the current status of injured clam resources in PWS, and will assess the effects of clam abundance, size structure, and recruitment dynamics on the recovery of sea otter populations injured by EVOS. We will study both intertidal and nearshore subtidal clam populations known to be used as food by sea otters.

Our specific research objectives are:

(1) Assemble, synthesize, and evaluate published literature on recruitment patterns of clam species that are common in nearshore habitats of PWS and are a significant part of the diet of PWS sea otters.

(2) Determine the abundance and size structures of existing clam populations in nearshore habitats at selected study sites in PWS. Taxa to be evaluated will include, but are not limited to: Saxidomus giganteus, Prototheca staminea, Tresus capax, Clinocardium nuttallii, Serripes groenlandicus, Mya arenaria, Mya truncata, Macoma spp., and Hiatella arctica. Some of the above taxa may be deleted because of individual site characteristics. Populations will be sampled in the intertidal zone and at two subtidal depths within the dive range of foraging sea otters. We will gather samples at three similar sites in NVP Program study areas distributed inside and outside of the EVOS area of PWS.

(3) Determine rate and pattern of recruitment to settlement containers in study sites as indicated in objective 2 above. Settlement data will be collected quarterly, allowing assessment of variation in recruitment intensity by season and year.

(4) Examine correlations of recruitment intensity of clams with habitat and oceanographic variables assessed in other EVOS-related projects.

2. Methods:

Numbered sections below are keyed to task numbers shown previously:

(1) This work will be done primarily by library database searches and consultation with present and past participants in EVOS Damage Assessment, General Restoration, Research and Monitoring, Habitat Protection, and related activities.

(2) Samples will be gathered at three sites beginning in summer 1995 in study areas to be selected for the NVP Program. Tentative study areas are north Knight Island/Naked Island, South Knight Island, and Green Island/Montague Island. Tentative depths for subtidal samples are 6 and 12 m. Representative samples of sediment grain size distribution and organic content will be gathered at each location sampled for clams.

(3) Settlement containers will be placed in each of the selected NVP study sites. Initial deployment will be done in summer 1995. During quarterly visits to study sites, containers will be retrieved for processing, and replaced with new containers. Thus, each container will have an exposure period of three months.

(4) This task primarily will involve consultation with other EVOS Restoration participants working on oceanographic characteristics and planktonic ecology during the period of our study. We will attempt to collaborate with other investigators to determine associations and correlations among clam recruitment patterns and significant oceanographic and planktonic events.

3. Schedule:

General milestones for this project:

Annual Progress reports:

Annual reports will be submitted each year in September.

Final Report:

The final report for the project will be submitted in September 1999.

Task-specific milestones:

Task 1: Compilation of information will be completed by 1 December 1995. Information will be incorporated in technical reports and publications that

result from this project.

Task 2: Field samples will be gathered quarterly beginning in summer 1995 and concluding in summer 1998. Technical manuscripts will be completed and submitted by 31 March 1996 and 30 August 1999. Other manuscripts may be submitted depending on evaluation of data during the course of the project.

Task 3: Settlement containers will be deployed first in summer 1995. Quarterly sampling will continue through summer 1998. A technical manuscript will be submitted for publication by 30 August 1999.

Task 4: Recruitment data will be integrated with other relevant data no later than 1 March of each year of the project, beginning in 1996 and concluding in 1999. A technical manuscript will be completed and submitted for publication by 30 September 1999.

Technical support for each task will be managed through the Institute of Marine Science (IMS), University of Alaska Fairbanks (UAF), and the Washington Cooperative Fish and Wildlife Research Unit (WACFWRU).

Field work for the project will be done at study sites in western and central Prince William Sound, Alaska, as specified above. Laboratory work, data analyses, and production of reports will be done primarily at IMS/UAF, Fairbanks, Alaska, and at WACFWRU, School of Fisheries, University of Washington, Seattle, Washington.

E. PROJECT IMPLEMENTATION

The NVP Program will be implemented through the National Biological Survey, Alaska Research Center, Anchorage, Alaska. The intertidal portion of this specific project will be implemented through the Alaska Department of Fish and Game. The subtidal portions of the project will be implemented through WACFWRU.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

The NVP Program, of which our project is part, will establish and maintain a system for integrating component projects, and for integrating NVP projects with other components of the EVOS Restoration Program. NVP will include a Program Coordinator to oversee the compatibility and complementarity of component projects, ensure that milestones are met and deliverables produced, and serve as liaison with other components of the EVOS Restoration Program. In addition, NVP will include a Program Data Manager to oversee database management, facilitate the reasonable exchange of Program data among component projects and to other elements of the EVOS Restoration Program, arrange research travel and charters for NVP investigators, and support the administrative needs of the Program Coordinator. The Program Data Manager will maintain a central repository of all biological data collected by NVP Program participants.

NVP Program participants have established near-term milestones for the development of effective Program integration and management. The milestones are reviewed in the NVP umbrella proposal document.

G. PUBLIC PROCESS

We will participate in all public meetings, workshops, and related activities organized by the EVOS Trustee Council, and in related meetings as requested by the Council. In addition, we will present interim results at technical workshops and meetings of Scientific Societies in order to maximize input from the scientific community on refinement of project goals and questions, and quality, relevance, and clarity of data analyses and conclusions.

H. PERSONNEL QUALIFICATIONS

Stephen C. Jewett has been a Research Associate at the School of Fisheries and Ocean Science, University of Alaska Fairbanks, since 1975. During this time he has been involved in numerous benthic and intertidal investigations throughout Alaska that emphasize assessment and/or monitoring. He has authored more than 30 publications in scientific journals and books. He has been the coordinator of the federal/state EVOS shallow subtidal investigations in Prince William Sound (1989-1994).

Glenn R. VanBlaricom has done research on coastal ecosystems since 1970, and has been involved in research on sea otters and their ecosystems for 17 years. VanBlaricom studied relationships of sea otters and intertidal mussels in Prince William Sound from 1978 through 1986 and published papers on population size structure and individual growth rate of mussels, and effects of foraging by sea otters. VanBlaricom worked on sea otter rescue and rehabilitation in the immediate aftermath of EVOS, primarily in the Kenai region, and has published one paper on rehabilitation strategies. Currently VanBlaricom is Assistant Unit Leader (Wildlife), Washington Cooperative Fish and Wildlife Research Unit, and is Associate Professor of Fisheries in the School of Fisheries, University of Washington. VanBlaricom currently serves on the Scientific and Statistical Committee of the Pacific Fisheries Management Council, the Committee of Scientific Advisors of the Alaska Sea Otter Commission, and the Board of Governors of the Society for Marine Mammalogy.

I. BUDGET:

This project will include two integrated components. Stephen C. Jewett will be principal investigator for work in intertidal habitats. Glenn R. VanBlaricom will be principal investigator for work in subtidal habitats.

FY 95 (cost-share contributions not included):

	Intertidal	Subtidal	Total
Personnel	48,567	0	48,567
Travel	2,490	12,500	14,990
Contractual Services	21,500	45,000	66,500
Commodities	1,500	20,000	21,500
Equipment	0	28,000	28,000
Capital Outlay	0	0	0
General Administration	14,811	15,800	30,611
TOTALS	$88,868	$121,300	$210,168

Cost sharing during FY 95:

From the Washington Cooperative Fish and Wildlife Research Unit (WACFWRU):

(1) Salary for Dr. VanBlaricom ($10,000).
(2) Administrative and analytical support.

From the University of Washington (UW):

(1) Waiver of overhead charges, through standing agreement with WACFWRU ($36,925).

From the National Oceanic and Atmospheric Administration:

(1) Support for graduate student from the Hazardous Materials Response and Assessment Division (NOAA/HAZMAT) through a research work order to UW and WACFWRU ($30,000).

Total cost-share contributions, FY 95: $76,925.

FY 96 (cost-share contributions not included):

	Intertidal	Subtidal	Total
Personnel	92,940	20,928	113,868
Travel	2,490	25,720	28,210
Contractual Services	21,500	50,700	72,200
Commodities	0	15,000	15,000
Equipment	0	5,000	5,000
Capital Outlay	0	0	0
General Administration	23,386	17,602	40,988
TOTALS	$140,316	$134,950	$275,266

Cost sharing during FY 96:

From WACFWRU:

(1) Salary for Dr. VanBlaricom ($10,000).
(2) Administrative and analytical support.

From UW:

(1) Waiver of overhead charges, through standing agreement with WACFWRU ($41,072).

Total cost-share contributions, FY 96: $51,072.

Project Title Effects of predatory invertebrates on nearshore clam populations in sea otter habitats of Prince William Sound

[A component project of: Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound (NVP)]

Project # 95025H Revised 8/3/94

Proposed By Glenn R. VanBlaricom
Washington Cooperative Fish and Wildlife Research Unit
Division of Cooperative Research
National Biological Survey

Lead Trustee Agency National Biological Survey

Cost FY 95 $118,350

Cost FY 96 $111,550

Cost Total $256,670

Duration 3 years (1 Apr 95 - 30 Sept 97)

Geographic Area Central and western Prince William Sound

Injured Resources Sea otters, clams

Injured Services Subsistence use of clams

Contact Person Leslie Holland-Bartels
Alaska Research Center
National Biological Survey
1011 East Tudor Road
Anchorage, Alaska 99503
Telephone: 907-786-3312
Fax: 907-786-3636

B. INTRODUCTION

This project is one component of an integrated ecosystem-scale Program entitled "Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound" (NVP). The NVP Program will assess predator-prey relationships in order to understand recovery patterns of significant vertebrate predators injured by the Exxon Valdez oil spill (EVOS) in Prince William Sound (PWS). As noted in the Program umbrella document, the NVP Program will utilize measured characteristics of prey populations as indicators of predator population density. Because of the important effects of sea otters on benthic ecosystems, abundance and dynamics of significant prey should provide information on the recovery status of sea otter populations.

This project examines effects of invertebrate predators (sea stars, snails, crabs) on clams, the primary prey for sea otters in PWS, in an effort to better assess the recovery status of sea otters, and to find explanations for an apparent failure of sea otters in some areas to recover from EVOS. Nearshore clam populations in PWS are a biological resource injured by EVOS. Patterns of recovery of clam populations from the EVOS are unknown. It is possible that damage to clam populations has contributed to the apparent failure of some PWS sea otter populations to recover from EVOS. Dynamics of clam populations often are influenced substantially by patterns of predation by invertebrates such as sea stars, crabs, and snails. This project will examine the hypothesis that high rates of clam consumption by predatory invertebrates are contributing to lack of recovery from EVOS damage in clam and sea otter populations in some portions of PWS.

Although the NVP Program focuses on injured populations of vertebrate predators, this component project will, in addition, provide useful information regarding EVOS damage to subsistence use of clams. Prior to EVOS, clams were an important subsistence food at numerous locations in PWS. EVOS damage has limited subsistence use of clam resources.

This project is most likely to be effective in achieving stated goals if it is pursued over several years. However, limitation of work to FY-95 will provide information of significant value to the EVOS Restoration Program.

C. NEED FOR THE PROJECT

This component of the NVP Program will contribute to the ability of resource managers to understand if sea otters and clams are recovering from EVOS, and if not why not, and will allow resource managers and decision makers to use ecosystem-scale data to select appropriate restoration options for sea otters and clams in PWS.

This project will address three important issues regarding the restoration of sea otter and nearshore clam populations in PWS:

(1) Are injured clam resources recovering? Clam populations are recognized as an injured resource, but recovery trends are unknown. Documentation of patterns of consumption by predatory invertebrates will provide useful information for determination of population growth trends and recovery potential for clams.

(2) What factors are constraining injured resources from recovering? Clams are the most important source of nutrition for sea otters in PWS. If patterns of predation by invertebrates are contributing to low productivity in clam populations, sea otters may be suffering a consequent inability to recover effectively from EVOS damage.

(3) How do patterns of clam consumption by predatory invertebrates influence subsistence clam resources in certain portions of the PWS region? An improved understanding of predatory invertebrate effects on clam availability will contribute to more judicious management of clam resources for human use during the recovery period.

D. PROJECT DESIGN

1. Objectives:

The NVP Program will use an integrated, rigorously-managed ecosystem approach to understand the recovery status of nearshore vertebrate predators damaged by EVOS. This component project will assess the effects of predatory sea stars, snails, and crabs on clam population dynamics in sea otter habitats influenced by EVOS. We will study predation by invertebrates on both intertidal and nearshore subtidal populations of clams utilized by sea otters.

Our specific research objectives are:

(1) Assemble, synthesize, and evaluate available literature and data on patterns of predation on bivalves by predatory invertebrate species known to occur with reasonable abundance in Prince William Sound, both in intertidal habitats and in subtidal habitats within the foraging range of sea otters.

(2) Determine the diets of potentially important invertebrates in nearshore habitats of PWS. Initially, efforts will focus on the following species or taxa known to consume bivalves in PWS: Sea stars: Pycnopodia helianthoides, Evasterias troschelii; Crabs: Telmessus cheiragonus, Cancer spp.; Snails: Nucella spp. Predatory species of concern may be added or deleted from the list depending on the results of task 1 (above) and early phases of field work. Dietary data will include species composition, numbers or biomass of individuals consumed, and size distribution of individuals consumed. Dietary data will be gathered in the intertidal zone and at two subtidal depths, 6 m and 12 m, in NVP Program study sites.

(3) Determine activity-time budgets of predatory invertebrates that forage on bivalves in PWS. Activity data will be integrated with dietary data (task 2 above) to estimate prey consumption rate for each species of predator.

(4) Determine patterns of density for predatory invertebrates. Data from tasks 2 and 3 will be integrated with results to provide an estimate of size specific mortality rate of clam populations as a result of predation by invertebrates.

(5) If feasible, determine by experimental removal the effects of predation by invertebrates on mortality, population density, and size structure of clam populations. Execution of this task will be contingent on identification of predator species with significant rates of predation, and of clam species with rates of recruitment sufficiently high that a meaningful result is plausible for the experiment.

2. Methods:

Numbered sections below are keyed to task numbers shown previously:

(1) This work will be done primarily by library database searches and consultation with present and past participants in EVOS Damage Assessment, General Restoration, Research and Monitoring, Habitat Protection, and related activities.

(2) Samples will be gathered at three sites in study areas to be selected for the NVP Program beginning in summer 1995. Tentative study areas are north Knight Island/Naked Island, South Knight Island, and Green Island/Montague Island. Samples will be gathered at three depths (intertidal, 6 m, and 12 m). Data will be collected by direct observation during low

tide or SCUBA dives (all species), and where necessary will be supplemented by examination of stomach contents.

(3) Individuals will be observed and scored for activity type during samples placed by stratified random assignment through the 24-hour cycle in each of the three study areas. Intertidal organisms will be observed directly at low tide or using SCUBA gear if necessary. Subtidal species will be observed during SCUBA dives.

(4) Densities of predatory invertebrates will be assessed at three sites within the three study areas on a quarterly schedule beginning in summer 1995. Techniques will vary with species depending on distributional characteristics, activity, and visibility. In most cases sampling will be done by counts in randomly-placed plots or belt transects. Intertidal species will be surveyed during low tide, subtidal species with SCUBA dives.

(5) Individuals of the species selected for removal will be gathered during low tide or SCUBA dive on a quarterly basis and transported alive to a distant location to be released unharmed. Clam populations at removal and control sites (minimum of two each) will be sampled by digging and screening (intertidal populations) or by suction dredging (subtidal populations) in randomly-placed plots within the study sites. Predator removals will begin in summer 1995.

3. Schedule:

General milestones for this project:

Annual Progress Reports:

Annual reports will be submitted each year in September.

Final Report:

The final report for the project will be submitted in September 1997.

Task-specific milestones:

Task 1: Compilation of information will be completed by 1 December 1995. Information will be incorporated in technical reports and publications that result from this project.

Task 2: Field samples will be gathered quarterly beginning in summer 1995 and concluding in fall 1996. A technical manuscript will be completed and submitted for publication by 30 September 1997.

Task 3: Same schedule as task 2, above.

Task 4: Same schedule as task 2, above.

Task 5: If found to be feasible, removals will be done quarterly, beginning in summer 1995 and concluding in fall 1996. Samples of clam density will be done

quarterly from fall 1995 through fall 1996. A technical manuscript will be completed and submitted for publication by 30 September 1997.

Technical support for each task will be managed through the Washington Cooperative Fish and Wildlife Research Unit (WACFWRU) and the University of Washington (UW).

Field work for the project will be done at study sites in western and central Prince William Sound, Alaska, as specified above for task 2. Laboratory work, data analyses, and production of reports will be done primarily at WACFWRU and UW.

E. PROJECT IMPLEMENTATION

The NVP Program will be implemented through the National Biological Survey, Alaska Research Center, Anchorage, Alaska. This component project will be implemented through WACFWRU.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

The NVP Program, of which our project is part, will establish and maintain a system for integrating component projects, and for integrating NVP projects with other components of the EVOS Restoration Program. NVP will include a Program Coordinator to oversee the compatibility and complementarity of component projects, ensure that milestones are met and deliverables produced, and serve as liaison with other components of the EVOS Restoration Program. In addition, NVP will include a Program Data Manager to oversee database management, facilitate the reasonable exchange of Program data among component projects and to other elements of the EVOS Restoration Program, arrange research travel and charters for NVP investigators, and support the administrative needs of the Program Coordinator. The Program Data Manager will maintain a central repository of all biological data collected by NVP Program participants.

NVP Program participants have established near-term milestones for the development of effective Program integration and management. The milestones are reviewed in the NVP umbrella proposal document.

G. PUBLIC PROCESS

We will participate in all public meetings, workshops, and related activities organized by the EVOS Trustee Council, and in related meetings as requested by the Council. In addition, we will present interim results at technical workshops and meetings of Scientific Societies in order to maximize input from the scientific community on refinement of project goals and questions, and quality, relevance, and clarity of data analyses and conclusions.

H. PERSONNEL QUALIFICATIONS

Glenn R. VanBlaricom has done research on coastal ecosystems since 1970, and has been involved in research on sea otters and their ecosystems for 17 years. VanBlaricom studied relationships of sea otters and intertidal mussels in Prince William Sound from 1978 through 1986 and published papers on population age structure and individual growth rate of mussels, and effects of foraging by sea otters (see attached vita). VanBlaricom worked on sea otter rescue and rehabilitation in the immediate aftermath of EVOS, primarily in the Kenai region, and has published one paper on

rehabilitation strategies. Currently VanBlaricom is Assistant Unit Leader (Wildlife), Washington Cooperative Fish and Wildlife Research Unit, and is Associate Professor of Fisheries in the School of Fisheries, University of Washington. VanBlaricom currently serves on the Scientific and Statistical Committee of the Pacific Fisheries Management Council, the Committee of Scientific Advisors of the Alaska Sea Otter Commission, and the Board of Governors of the Society for Marine Mammalogy.

I. BUDGET

FY 95 (cost share contributions not included):

Personnel	4,910
Travel	12,500
Contractual Services	45,000
Commodities	12,500
Equipment	28,000
Capital Outlay	0
General Administration	15,440
TOTALS	$118,400

Cost sharing during FY 95:

From the Washington Cooperative Fish and Wildlife Research Unit (WACFWRU):

(1) Salary for Dr. VanBlaricom ($10,000).

(2) Administrative and analytical support.

From the University of Washington (UW):

(1) Waiver of overhead charges, through standing agreement with WACFWRU ($36,015).

(2) Stipend support for graduate student ($15,700).

Total cost share contributions, FY 95: $61,715.

FY 96 (cost share contributions not included):

Personnel	20,800
Travel	12,500
Contractual Services	50,700

Commodities	10,000
Equipment	3,000
Capital Outlay	0
General administration	14,550
TOTALS	$111,550

Cost sharing during FY 96:

From WACFWRU:

(1) Salary for Dr. VanBlaricom ($10,600).

(2) Administrative and analytical support.

From UW:

(1) Waiver of overhead charges, through standing agreement with WACFWRU ($33,950).

Total cost share contributions, FY 96: $44,550.

Project Title Relation of sea urchin population structure to recovery of injured nearshore vertebrate predators [A component of Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound - Project # 95025)

Project # 95087 Revised 8/3/94

Proposed By Stephen C. Jewett, University of Alaska Fairbanks
Thomas A. Dean, Ph.D., Coastal Resources Associates, Inc.

Lead Trustee Agency Alaska Department of Fish & Game

Cost FY 95 $103,200

Cost FY 96 $151,200

Cost Total $597,000 (5 years)

Duration Five years (project start-up April 1995)

Geographic Area Prince William Sound

Injured Resource Subtidal organism (sea urchins)

Contact Person Joseph Sullivan, Ph.D.
Habitat & Restoration Division
Alaska Department of Fish & Game
Anchorage, AK 99518-1599
(907) 267-2213

B. INTRODUCTION

Sea urchins, a favored food of otters, consume large amounts of algae (especially kelps) and can have profound effects on the structure of nearshore ecosystems. Prior to the spill there were few urchins in Prince William Sound, presumably because of predation by otters. It was predicted that a decrease in otter populations, as a result of the Exxon Valdez oil spill, may lead to increases in urchin densities and subsequent decreases in kelps. Observations in 1990, 1991 and 1993 suggest that, in fact, urchin populations are increasing within the Sound. We noted higher than usual urchin densities in 1993 under cobbles in the lower intertidal, and occasional large patches of small urchins in subtidal eelgrass beds. Monitoring of epibenthic invertebrates within the Sound has been carried out previously (Subtidal Studies, University of Alaska), but there have been no previous efforts to specifically examine sea urchin populations.

This project will examine changes in the distribution and abundance of sea urchins in Prince William Sound, and will examine the availability of sea urchins as food for injured sea otter resources. Questions that will be addressed regarding sea urchin populations are:

1. Are urchin population densities increasing in the Sound?
2. If so, is this increase related to the a lack of predation by otters?

3. Is the increasing urchin population a potential food source for recovering otter populations?

C. NEED FOR THE PROJECT

One hypothesis for a lack of recovery of sea otters is that food availability is limiting. Sea urchins provide an important potential food source for otters. An increase in urchin populations may provide food for otters that may offset otherwise impoverished food supplies.

In addition, increases in sea urchin densities may lead to drastic changes within the benthic community. Sea urchins can have profound effects on nearshore communities, including a reduction in kelps which provide substrate for herring spawn. We need to monitor these potential changes.

D. PROJECT DESIGN

1. Objective: Document changes in the population density of sea urchins and their availability as food for sea otters.

2. Methods: Examine sea urchins at shallow (< 20 m) subtidal sites where sea otter densities currently range from absent to high. Population density, size structure, recruitment, and growth of urchins will be determined at all sites. Define urchin habitat. Then select sites (at random) from the universe of sites within each category that has appropriate urchin habitat. At each site, determine the size frequency and density of urchins. Examine growth of urchins at representative sites by marking urchins with a calcein dye, releasing them, and collecting urchins at a later time and examining growth rings.

3. Schedule: The field work for this project will begin in June 1995 and be completed in September 1995. Laboratory analysis of urchin growth will be completed February 1996. Data analysis and draft report preparation will be completed in May 1996. Deliverables will consist of a FY 95 progress report to be submitted in September 1995, and a final report to be completed by May 1996. Field work and reporting will follow a similar schedule for subsequent years.

4. Technical Support: Outside technical support will be required for the analysis of growth ring data.

5. Location: The project will be undertaken in western Prince William Sound.

E. PROJECT IMPLEMENTATION

The principal investigators have been conducting damage assessment/monitoring studies in the shallow subtidal regions of Prince William Sound since 1989. Since these studies have mainly been implemented through Alaska Department of Fish & Game (ADF&G), and since this project will overlap with the ongoing work in the subtidal eelgrass habitat, it is appropriate for this project to also be implemented through ADF&G.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

This study is a component of the nearshore ecosystem project description entitled "Processes Structuring Recovery of Injured Nearshore Vertebrate Predators" (Project # 95025) submitted through National Biological Survey. Information on the food and feeding habits of sea otters will be critical in evaluating the interactions between otters and urchins.

G. PUBLIC PROCESS

Investigators in this project have taken part of public participation workshops sponsored by the Trustee Council to examine research needs. Future workshops will be supported. All documents produced will be made available for public review.

H. PERSONNEL QUALIFICATIONS

Stephen C. Jewett, Co-Principal Investigator, has been a Research Associate at the School of Fisheries and Ocean Science (SFOS), University of Alaska Fairbanks since 1975. During this time he has been involved in numerous benthic investigations throughout Alaska that emphasize assessment and/or monitoring. He has authored more than 30 publications in scientific journals and books. He has been the coordinator of the federal/state EVOS shallow subtidal investigations in Prince William Sound (1989-94). Mr. Jewett also serves as the Scientific Diving Officer for UAF, coordinating all scientific diving operations.

Thomas A. Dean, Ph.D., Co-Principal Investigator, is President of the ecological consulting firm Coastal Resources Associates, Inc. (CRA) in Vista, CA. He has over 20 years of experience in the study of nearshore ecosystems, and has authored over 20 publications, including several papers dealing with sea urchin and kelp interactions. He has extensive experience in long-term monitoring studies with marine plants and invertebrates. He has had a major role in both the shallow subtidal and intertidal EVOS investigations since 1989.

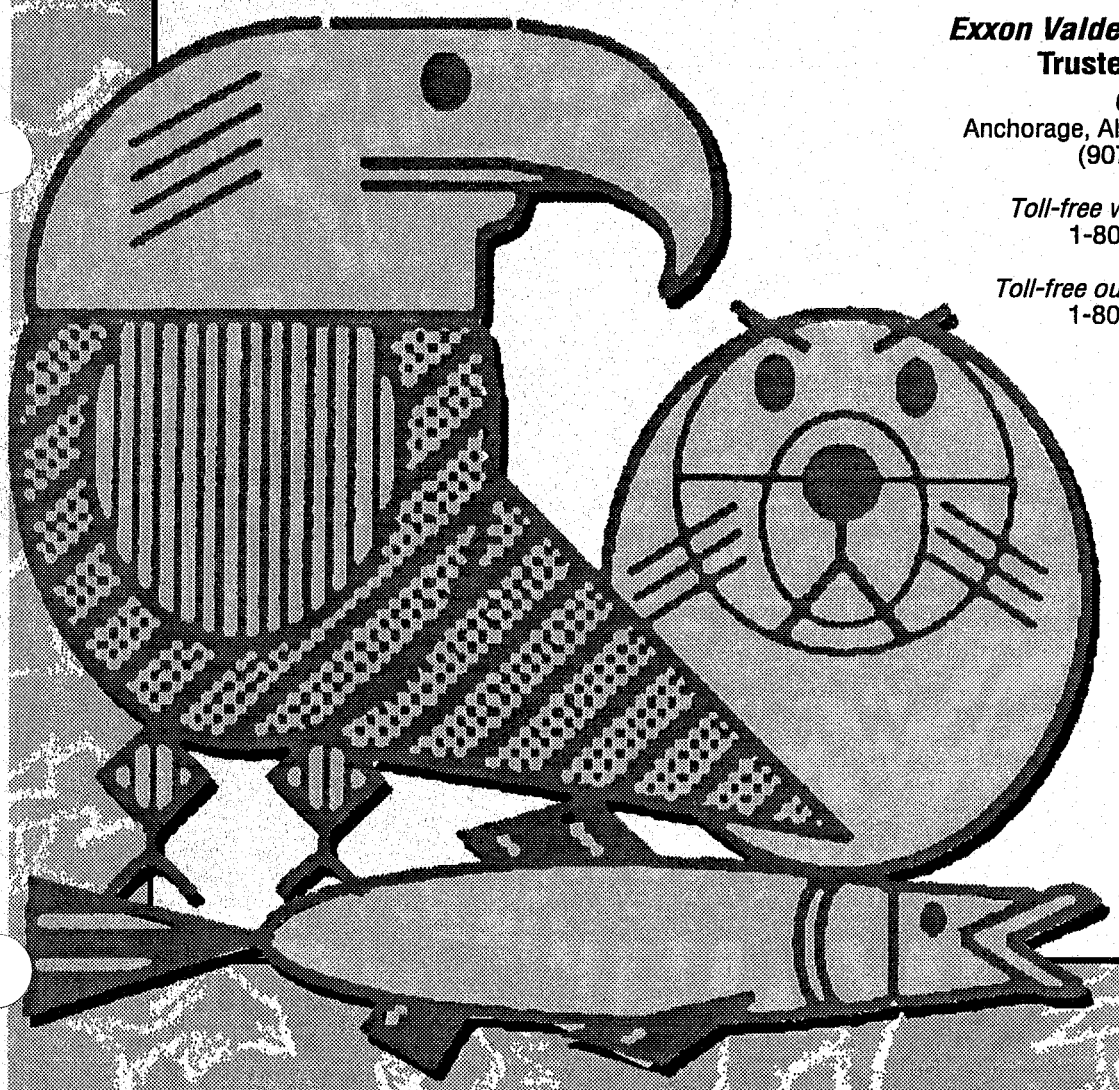
I. BUDGET

	FY 95	FY 96
Personnel	60,000	80,000
Travel	3,000	3,000
Contractual Services	20,000	40,000
Equipment/Commodities	3,000	3,000*p2397Y
Capital Outlay	0	0
General Administration	17,200	25,200
Totals	$103,200	$151,200

Draft
Fiscal Year 1995 Work Plan

Supplement Volume II

Brief Project Descriptions



Prepared by:

***Exxon Valdez* Oil Spill Trustee Council**

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August 1994

Dear Reader:

This document, *Draft Fiscal Year 1995 Work Plan - Supplement Volume II*, contains brief descriptions of 79 project proposals submitted to the *Exxon Valdez* Oil Spill Trustee Council for funding in Fiscal Year 1995. These 79 projects are those which, after preliminary review, have been assigned to Evaluation Categories 3, 4, 5 and 6.

Projects assigned to Evaluation Category 3 lack a clear relationship to restoration or are otherwise of low priority. Category 4 projects raise significant legal or policy issues. Category 5 projects fund only data analysis and report writing efforts associated with 1994 projects. Category 6 projects provide funding to complete projects begun in 1994. The preliminary review and categorization were conducted by the Trustee Council's Executive Director, with the assistance of the Chief Scientist, independent peer review scientists, and agency staff. Proposals were reviewed for scientific and technical merit, potential restoration benefit, and legal and policy considerations. The identification of a project in a particular category does not reflect an action or decision on the part of the Trustee Council regarding any specific project or proposal to be funded in FY 95.

Descriptions of projects identified as Evaluation Categories 1 and 2 are contained in *Draft Fiscal Year 1995 Work Plan - Supplement Volume I*. Volume I may be obtained through the *Exxon Valdez* Restoration Office (see address below). Budget information for all projects is contained in *Draft Fiscal Year 1995 Work Plan - Supplement Volume III*. Volume III is available for review at the Restoration Office, and at libraries and Legislative Information Offices throughout the spill area. Copies of individual project descriptions or budgets may be requested by calling the Restoration Office (see telephone numbers below).

A complete discussion of the Trustee Council's restoration efforts, including the project proposal and evaluation process, is contained in the *Draft Fiscal Year 1995 Work Plan - Summary*. Copies of the summary are available from the Restoration Office.

Exxon Valdez Oil Spill Trustee Council Restoration Office
645 G Street
Anchorage, Alaska 99501
Telephone (907) 278-8012 (toll-free within Alaska at 1-800-478-7745;
from outside Alaska at 1-800-283-7745)

Project descriptions contained in the *Draft Fiscal Year 1995 Work Plan - Supplement Volume II* appear in numerical order. Most of the project descriptions contain the following information:

Project Number: A numerical coding assigned for tracking purposes.

Restoration Category: The means by which a project would achieve restoration goals. The restoration categories are research; monitoring; general restoration; habitat protection and acquisition; administration, public information and science management; and restoration reserve.

Proposed By: The organization or individual that submitted the project.

Lead Trustee Agency: For projects not submitted by one of the six Trustee Agencies, the agency that has been assigned administrative responsibility for the project. The six Trustee Agencies are the Alaska Department of Environmental Conservation (ADEC), the Alaska Department of Fish and Game (ADFG), the Alaska Department of Natural Resources (ADNR), the U.S. Department of Interior (DOI), the U.S. Forest Service (USFS), and the National Oceanic and Atmospheric Administration (NOAA).

Cooperating Agencies: Trustee Agencies, other than the Lead Trustee Agency, that would participate in implementation and management of the project.

Cost FY 95: The amount of money being requested for the project in federal fiscal year 1995 (October 1, 1994 - September 30, 1995).

Cost FY 96: The amount of money that will be requested for the project in federal fiscal year 1996 (October 1, 1995 - September 30, 1996).

Total Cost: The total amount of money, if known, that will be requested to bring the project to completion.

Duration: The total number of fiscal years, if known, for which money will be requested for the project.

Geographic Area: The geographic area in which the field work on the project will take place.

Injured Resource/Service: The resource or service injured by the spill that the project is designed to restore.

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 3, 4, 5 and 6 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95002	Leave No Trace Education Program	Ford, National Outdoor Leadership School	General Restoration	$177.7	4
95003	Area E Commercial Salmon Permit Buyback Program	Mykland	General Restoration	$11,735.0	4
95006	Paint River Pink Salmon Development	Mears, Cook Inlet Aquaculture Assn.	General Restoration	$173.9	3
95009A	Trophics and Community Structure in the Intertidal and Shallow Subtidal	Highsmith, UAF	Research	$455.4	3
95009B	Primary Productivity as a Factor in the Recovery of Injured Resources in Prince William Sound	Stekoll, UAF	Research	$218.9	3
95009E	Community Structure of Mobile Foragers Using the Nearshore	USFS	Research	$280.5	3
95010	Intertidal Fauna and Flora Species Composition, Abundance and Variability Relative to Physical Habitat Controls	Schoch, Oregon State Univ.	Research	$73.5	3
95016	A Tribute to Prince William Sound	Kremen	General Restoration	$161.0	4
95017	Port Graham Coho Salmon Subsistence Fishery Restoration Project	Daisy, Aquafarm	General Restoration	$587.9	3
95022	Foraging Efficiencies at Temporary Food Patches	Scheel, PWS Science Center	Research	$183.1	3
95025D	Settlement Rates of Nearshore Invertebrates, Oceanic Processes and Population Recovery: Are They Linked?	DOI	Research	$435.7	3
95025G	Relation of Clam Population Structure to Recovery of Injured Nearshore Vertebrate Predators	Jewett, UAF and Van Blaricom, NBS	Research	$208.5	3
95025J	Primary Productivity as a Factor in the Recovery of Injured Resources in Prince William Sound	Stekoll, UAF	Research	$397.0	3

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 3, 4, 5 and 6 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95042	Five-year Plan to Remove Predators from Seabird Colonies	Harrison, Pacific Seabird Group	General Restoration	$75.0	4
95043A	Cordova Cutthroat Trout Habitat	USFS	General Restoration	$22.7	3
95043B	Carry-forward: Cutthroat and Dolly Varden Rehabilitation in Western PWS	USFS	General Restoration	$108.6	6
95045	Green Island Intertidal Restoration Monitoring	Juday and Foster, UAF	Monitoring	$26.4	3
95046	Long-term Record in Tree Rings of Climatic Features	Juday, UAF	Research	$153.6	3
95047	Seal Contamination	McKee	General Restoration		3
95049	Independent Review of Restoration and Monitoring Projects	Ruggerone, Natural Resources Consultants	Administration and Public Information	$31.9	3
95050	A Test of Sonar Accuracy in Estimating Escapement of Sockeye Salmon	Ruggerone, Natural Resources Consultants	Research	$79.3	4
95053	Cordova's Mini-Imaginarium	Trowbridge, PWS Science Center	General Restoration	$62.6	4
95055	Prehistoric Ecological Baseline for PWS	USFS	Research	$256.1	3
95060	Spruce Bark Beetle Infestation Impacts on Injured Fish and Wildlife Species of the *Exxon Valdez* Oil Spill	ADFG	Habitat Protection	$213.9	4
95065	PWSAC Pink Salmon Fry Mortality	Olsen, PWS Aquaculture Corporation	Research	$59.6	4
95071	Monitoring Nearshore Fish Species for Persistence of Oil Exposure and Ecotoxicological Effects	NOAA	Research	$231.0	3
95073	Impact of Killer Whale Predation on Harbor Seals in PWS	NOAA	Research	$228.2	3

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 3, 4, 5 and 6 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95077	Recreation Impacts in PWS: Human Impacts as a Factor Constraining Long Term Ecosystem Recovery	Ford, National Outdoor Leadership School	Research	$117.0	3
95078	Culture, History, and Ecosystems: Assessment of Cultural/Historical Strategies to Building Long-term Understanding of Ecosystems in the Oil Spill Area	DOI	Research	$166.7	3
95079	Pink Salmon Restoration Through Small-scale Hatcheries	Van Hyning, NERKA, Inc., Aquabionics Inc.	General Restoration	$150.0	4
95080	Fleming Spit Recreation Area Enhancements	The Cordova Sporting Club	General Restoration	$1,365.0	4
95082	"Mor-Pac Hill" Campground Improvements	The City of Cordova	General Restoration	$360.0	4
95084	Odiak Camper Park Expansion	The City of Cordova	General Restoration	$266.0	4
95085	Cordova Historical Marine Park	Cordova Planning and Harbor Commission	General Restoration	$196.5	4
95086B	Population Dynamics of Eelgrass and Associated Fauna	Stekoll, UAF	Research	$78.3	3
95093	PWSAC: Restoration of Pink Salmon Resources and Services	Olsen, PWS Aquaculture Corporation	General Restoration	$1,690.3	4
95095	Quantification of Stream Habitat for Harlequin Ducks and Anadromous Fish Species from Remotely Sensed Data	Podolsky, Avian Systems, Inc.	Habitat Protection	$88.0	3
95096	Restoration of Murres by Way of Social Attraction and Predator Removal	Podolsky, Avian Systems, Inc.	General Restoration	$167.0	3
95097	Restoration of Murres by Way of Transplantation of Chicks: A Feasibility Study	Podolsky, Avian Systems, Inc.	General Restoration	$176.0	3
95098	Identification of Seabird Feeding Areas from Remotely Sensed Data	Podolsky	General Restoration	$74.0	3

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 3, 4, 5 and 6 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95099	Murrelet Vocalization in Conjunction with Artificial Nests: A Possible Means of Attraction to Habitat	Podolsky	General Restoration	$77.0	3
95102-CLO	Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound	DOI	Research	$63.8	5
95107	Subtidal Site Verification	Jewett, UAF	Monitoring	$56.2	4
95110-CLO	Closeout: Habitat Protection and Acquisition	ADNR	Habitat Protection	$143.9	5
95111	Sustainable Rockfish Yield	ADFG	General Restoration	$222.6	3
95112	Rockfish Restoration Objective	ADFG	General Restoration	$53.7	3
95113	Energetics of Intertidal Fish: The Connection between Lower and Upper Trophic Levels	Barber, UAF	Research	$392.5	3
95114	Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers	Kline, PWS Science Center	Research	$145.1	3
95116	Restoration of Intertidal Oiled Mussel Beds by Nondestructive Manipulation/Flushing with PES-51	Rog, PES Services AK, Inc.	General Restoration	$453.2	4
95119-BAA	Food Limitation on Recovery of Injured Marine Bird Populations	Sydeman, Point Reyes Bird Observatory	Research	$124.9	3
95122	Mapping Potential Nesting Habitat of Marbled Murrelets in PWS Using Geographic Databases	DeVelice	Habitat Protection	$167.5	3
95123	Tatitlek Community Store	Komkoff, Tatitlek IRA Council	General Restoration	$300.0	4
95124A	Tatitlek Mariculture Development Project	Daisy, Tatitlek IRA Council	General Restoration	$109.5	4
95124B	Tatitlek Mariculture Development Project - Capital Outlay	Daisy, Tatitlek IRA Council	General Restoration	$405.0	4

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 3, 4, 5 and 6 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95125	Tatitlek Sockeye Salmon Release Program	Komkoff, Tatitlek Traditional Council	General Restoration	$39.0	4
95127	Tatitlek Coho Salmon Release Program	Komkoff, Tatitlek Traditional Council	General Restoration	$39.0	4
95128	Teaching Subsistence Practices and Values	Callaway, NPS	General Restoration	$69.0	4
95129	Tatitlek Fish and Game Processing Center and Smokery	Komkoff, Tatitlek IRA Council	General Restoration	$515.5	4
95130	Mental Health Center	Vlasoff, Chugachmuit and Copper Mountain Foundation	General Restoration	$106.1	4
95134	Chenega Bay Mariculture Development Project	Evanoff, Chenega Bay IRA Council	General Restoration	$184.3	4
95135	Subsistence Harvest Support	Chenega Bay Village IRA Council	General Restoration	$50.0	4
95136	Skin Sewing Crafts Restoration	Callaway, NPS	General Restoration	$29.9	4
95139B	Closeout: Otter Creek/Shrode Creek Instream Restoration	USFS	General Restoration	$5.2	5
95139D	Salmon Instream Habitat and Stock Restoration--Pink Creek and Horse Marine Barrier Bypass Development	ADFG	General Restoration	$61.5	3
95140	Subsistence Skills Program	Olsen, Valdez Native Association	General Restoration	$36.7	4
95141	Afognak Island State Park Interim Support	ADNR	General Restoration	$309.4	4
95165	Carry-forward: PWS Herring Genetic Stock Identification	ADFG	General Restoration	$105.4	6
95199-CLO	Institute of Marine Science - Seward Improvements EIS	ADFG	Research	$45.9	5
95200	Public Access	USFS	Habitat Protection	$50.2	3

DRAFT FISCAL YEAR 1995 WORK PLAN

— Evaluation Category 3, 4, 5 and 6 Projects —

(FY 95 dollar figures in thousands)

Project No.	Project Title	Project Proposer	Project Type	FY 95	Cat.
95259	Restoration of Coghill Lake Sockeye	ADFG	General Restoration	$333.0	3
95285-CLO	Closeout: Subtidal Sediment Recovery Monitoring	NOAA	Monitoring	$121.0	5
95320B	PWS Pink Salmon Stock Identification and Monitoring (CWT)	ADFG	General Restoration	$84.3	4
95320C	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in PWS	ADFG	General Restoration	$642.2	4
95320I(3)	Purchase of Isotope Radio Mass Spectrometer	Schell, Institute of Marine Science	Research	$257.4	3
95320K	PWSAC: Experimental Fry Release	Olsen, PWS Aquaculture Corporation	Research	$47.3	4
95320V	Herring Predation by Humpback Whales in PWS	Matkin, North Gulf Oceanic Society	Research	$279.8	3
95417	Carry-forward: Waste Oil Disposal Facilities	ADEC	General Restoration	$232.2	6
95422-CLO	Closeout: Restoration Plan EIS/Record of Decision	USFS	Administration and Public Information	$20.0	5
95428-CLO	Closeout: Subsistence Planning Project	ADFG	General Restoration	$100.1	5

Leave No Trace Educational Program: Reducing Human Impact to Assist Long Term Ecosystem Recovery

Project Number: 95002

Proposed By: The National Outdoor Leadership School (NOLS)

Don Ford
NOLS Alaska Director
Box 981
Palmer, AK 99645
907-745-4047

Rich Brame
NOLS Outreach & Training
288 Main Street
Lander, WY 82520
307-332-8800

Lead Trustee Agency: USFS

Cooperating Agencies: ADNR

Cost FY 95: $158,700

Cost FY 96: $95,600

Total Cost: $254,300

Duration: 2 years

Geographic Area: Prince William Sound

Injured Resource/Service: Recreation and tourism

INTRODUCTION

Through a Memorandum of Understanding signed in the spring of 1993, the National Outdoor Leadership School (NOLS) has become a partner with the U.S. Forest Service, National Park Service, and Bureau of Land Management in the national Leave No Trace (LNT) program. Leave No Trace is an educational program designed to give users the best minimum-impact techniques and ethics available for their recreational use of America's wildlands. NOLS, as the leader in backcountry education and leadership, has committed to develop and distribute LNT curriculum and educational materials for all major backcountry recreational environments nation-wide.

NOLS seeks funding from the Trustees, through a contract with the USDA Forest Service, for a three phase Leave No Trace educational project. The phases can be funded and conducted as a whole or as separate and distinct projects. The three proposed phases also address a comprehensive variety of target audiences and learning styles while keeping to NOLS'

traditional strength and philosophy: hands-on education works.

By educating the users of PWS, the Leave No Trace program will help reduce the human impacts detrimental to long term ecosystem recovery.

PROJECT DESCRIPTION

The three phases of the Leave No Trace program for Prince William Sound serve to minimize the impacts caused by kayakers, tour groups, hunters, and other recreationist. This is particularly important on the Sound where the EVOS has changed the natural character and resilience of many beaches and bays. Changes in the traditional recreation patterns and locations caused by the spill mean that formerly pristine or infrequently used areas are now receiving heavier use. Additionally, with increase notoriety as a result of the spill, more people are coming to the Sound. The effect of this increased and concentrated recreational use can be mitigated through education using common themes and valid research.

A. Objectives

1. Through education, reduce impacts of recreation users on recovering resources and in areas that are experiencing increased or new use resulting from changed use patterns.

2.. Educate a wide array of user groups in PWS on minimum-impact techniques and ethics.

3. Create a contingent of educators in Alaska who can train others in minimum-impact techniques.

B. Methods

The methods used to educate recreation users of Prince William Sound on minimum-impact techniques and ethics is accomplished in three phases.

Phase I

During the summer of 1995, NOLS will reproduce and distribute 10,000 Leave No Trace Outdoor Skills & Ethics Temperate Coastal Zones booklets which present the principles, ethics, and techniques of minimum-impact sea kayaking in southern Alaska. Guides, outfitters, hunters, tour group operators and user groups will be targeted for this written information.

During the early spring of 1995, NOLS staff will adapt the existing LNT Outdoor Skills & Ethics: Temperate Coastal booklet into a shorter pamphlet format designed for casual users such as tour participants, clients and interested travelers to the area. NOLS will work with the Forest Service, AK Department of Natural Resources, and organized user groups to distribute 50,000 copies of the LNT Coastal pamphlet during the 1995 and 1996 recreational seasons.

Phase II
Over a two-season period, NOLS will train 100 grant-funded user group representatives as Masters of Leave No Trace. The LNT Masters program is a six-day field course which thoroughly covers the techniques and ethics of minimum impact use for a given environment and also teaches the Masters how to present LNT to others. This proven curriculum and pyramid-style of intensive training has the goal of improving the use and preservation on recreational lands and coasts.

Targeted participants will have strong boating or kayaking background, be interested in education, and will be in positions where they can teach others such as the public, youths, or clients. Chugach National Forest and AK Department of Natural Resources should enact measures requiring certain types of commercial permit holders and employees to go through this course.

Phase III
In order to educate recreationists well before they actually enter Prince William Sound in 1996, NOLS will create a brief (20 minute) educational video of Leave No Trace techniques and ethics in Prince William Sound and other similar temperate coastal environments. Two hundred fifty videos will be provided at no cost to education programs, user groups, youth organizations, federal and state agencies, oil spill response agencies, Alaska Native corporations, outfitters and tour operators in PWS and in the communities of Valdez, Whittier, Tatitlek, Chenega and Cordova. Additional videos will be provided for sale to the public through NOLS and the Forest Service. This video will utilize a professional production company and use the existing NOLS productions of Soft Paths and Canyon Soft Paths as basic models.

C. Schedule

1/95	Contract between NOLS and Chugach National Forest
4/95	Create short pamphlet on LNT Outdoor Skills and Ethics Identify target participants ;for the LNT Masters
5/95 - 9/95	Distribute short pamphlet on LNT Outdoor Skills and Ethics
5/95 - 8/95	Conduct five LNT Masters Training Session in PWS
11/95	Progress Report submitted
12/95	Develop Challenge Cost Share Agreement with Forest Service for video production
3/96	Video script and storyboards completed
4/96 - 9/96	Filming for video
5/96 - 9/96	Continue distribution of pamphlet and booklet
5/956- 8/96	Conduct five more LNT Masters Training Session in PWS
11/96	Video completed and distributed
12/96	Final project report due

D. Location

This project will focus on Prince William Sound. The lands and communities used by

recreationist in Prince William Sound will benefit by this educational program. The principles of leave no trace may also carry to areas outside of PWS and the program could be expanded, with additional funding, to cover the entire spill affected area.

E. Technical Support

None needed.

FY95 BUDGET ($K)

FY 1995	USFS	ADNR	TOTAL
Personnel	10.0	5.0	15.0
Travel	1.5	0.0	1.5
Contractual	139.2	0.0	139.2
Commodities	0.0	0.0	0.0
Equipment	0.0	0.0	0.0
Sub-Total	150.7	5.0	155.7
Gen. Admin.	21.6	0.4	22.0
Total	172.3	5.4	177.7

Project #95003

Doc.#9506l3003

6/10/94

Cover Page For Invitation To Submit Restoration Projects For Fiscal Year 1995

1. Area E Commercial Salmon Permit Buyback Program

2. Project leader to be determined at a later time

3. State of Alaska, Commercial Fisheries Entry Commission
   8800 Glacier Hwy, #109
   Juneau, Ak 99801

4. Estimated cost of project, $11,735,000.00

5. 1/1/95, Completion date unknown

6. Until 25% of permits are retired and not to be reissued

7. Prince William Sound

8. James L. Mykland
   P.O. Box 1241
   Cordova, AK 99574
   907-424-7115

RECEIVED
JUN 13 1994
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

B. Introduction:

Commercial Salmon Fishing was injured by the EVOS. Each year that commercial fishing remains below prespill levels compounds the injury to the fishermen and, in many instances, the communities in which they live and work.

Prince William Sound is the only area in the oil spill impacted area that is experiencing major salmon run failures.

Prince William Sound Acqualture Corporation, which relies on pink salmon stocks to generate cost recovery funds, have been experiencing low pink salmon survival rates during the past three years. Conversely PWSAC's board of directors have voted to increase the cost recovery rate to 40% of total hatchery produced salmon stocks. This will put an additional burden on the common property fishery which is already reeling from run failures plus low prices.

C. Need for Project:

As long as Commercial Fishing and Pink Salmon are listed as a non-recovering resources the restoration of Prince William Sound will not be completed.

The genetic damage done to pink salmon stocks may take as long as ten to twenty years to be resolved.

If the commercial salmon fishing fleet is reduced then the social economic viliability of the rest of the fleet may be preserved until Prince William Sound is restored to pre-spill conditions.

This buyback program will help restore and contribute to the recovery of the Commercial Fishing Fleet in Prince William Sound.

D. Project Design:

The objective of this buyback program would be to purchase and retire 25% of the Salmon Purse Seine, Drift Gillnet, and Set Gillnet in Area E (PWS) of the State of Alaska Commercial Fisheries Registration Area.

The permits would be bought back at current market value.

The retirement of these permits would have to be done in conjuncture and regulation with the Commercial Fisheries Entry Commission

E. Project Implementation

The State of Alaska CFEC would be the state agency that implements this program.

G. Public Process

The majority of limited entry salmon permit holders from Area E are willing to support such a program.

Summary and Conclusions:

Poor returns of salmon stocks to Prince William Sound have caused severe impacts to commercial fisheries. The economic viability for the commercial fishermen in Prince William Sound is almost nil. There are not enough salmon stocks to support the commercial fishing fleet in its present state.

Commercial Fishermen are a resouce that is non-recovering. As long as salmon run failures continue to occur more commercial fishermen will be facing economic hardships unparalleled in the commercial fishing history of Prince William Sound.

Salmon stock recovery could take Ten to Twenty years. At least 25% of commercial fishermen in Area E will not be able to survive this recovery duration.

A commercial fishing permit buyback program will help the commercial fishing resource to recover and hopefully survive until the complete restoration of Prince William Sound has been done.

Project 95006

TITLE: PAINT RIVER PINK SALMON DEVELOPMENT PROJECT

PROJECT LEADER: Thomas E. Mears

LEAD AGENCY: Cook Inlet Aquaculture Association

COST OF PROJECT:

FY 95	$ 173,943
FY 96	215,000
FY 97	150,000
FY 98	30,000

PROJECT START-UP/ COMPLETION DATES:

June 1995 through August 1998

PROJECT DURATION: 4 years

GEOGRAPHIC AREA: Kamishak Bay in Lower Cook Inlet

CONTACT PERSON:

Thomas E. Mears
Cook Inlet Aquaculture Association
HC 2, Box 849
Soldotna, Alaska 99669
(907) 283-5761

INTRODUCTION

In 1989 oil from the Exxon Valdez spill fouled Kamishak Bay waters sufficiently to preclude customary commercial salmon fishing activities.

Paint River runs into the Kamishak Bay of Lower Cook Inlet about 100 miles WSW of Homer, Alaska.

Paint River watershed is contained within the expanded McNeil River State Game Sanctuary and newly created McNeil River State Game Refuge. Paint River did not previously produce salmon; a tidewater falls prevented fish access.

This project will aid restoration by developing a significant run of pink salmon at Paint River. The run, once developed, will be sustained through natural spawning.

Alaska Department of Fish and Game (ADF&G) and Cook Inlet Aquaculture Association (CIAA) have jointly determined the feasibility and desirability of establishing Paint River salmon populations. Paint River is believed capable of producing annual returns of more than 1.7 million adult salmon including up to 900,000 pink salmon.

NEED FOR THE PROJECT

This project will restore damaged pink salmon resources through development of a new naturally reproducing run.

PROJECT DESIGN

Objectives:

- Collect 8 million pink salmon eggs from Bruin Bay River for two consecutive years.

  Transport collected eggs to Tutka Hatchery for incubation.

  Transport about 6.8 million pink salmon fry from Tutka Hatchery for Paint River release.

- Construct crew cabin at Paint River intertidal fish ladder.

- Finish covering the fish ladder with bear proof grating.

- Monitor adult return as fish ascend the intertidal fish ladder for two consecutive years.

- Aerially survey Paint River watershed to determine distribution of spawning fish for 2 consecutive years.

Methods:

Pink salmon egg collections will occur at a weir erected above the intertidal zone in Bruin Bay River. Broodstock will be ripened in the River and spawned using delayed fertilization techniques. Broodstock carcasses will be returned to the River.

Iced containers of eggs and milt will be transported to Tutka Hatchery via floatplane. At the hatchery eggs will be fertilized, sanitized and loaded into NOPAD incubators. Standard incubation procedures will be utilized.

In the spring emergent fry will be transported from Tutka Hatchery to Paint River for immediate release several miles above the intertidal falls. Transport will be accomplished using an oxygenated tank slung from a helicopter.

A cabin about 18'x24' will be constructed adjacent to the Paint River intertidal fish ladder to house personnel necessary to operate the fish ladder. A bear proof fence (7' high cyclone fence with metal posts, fencing extending 4'below ground level, topped with multiple strands of barbed wire and electrified) will enclose the crew cabin.

As originally designed and constructed, about 2/3 of the upper surface of the fish ladder was fitted with grating to protect against intentional or accidental entry by bears. The remaining third was intended to be protected by fencing. The fencing appears to be inadequate and will be removed. The remaining portion of the fish ladder fitted with grating.

Adult pink salmon returns will be counted, weighed and sexed as fish ascend the intertidal fish ladder. Operating personnel will regulate ladder flows as required to afford fish passage.

As adult pink salmon migrate into the Paint River watershed, weekly aerial surveys will be conducted in order to determine the distribution of spawning fish.

Schedule:

CIAA would plan to construct the crew cabin and bear-proof fence and install grating on the fish ladder in June, 1995.

The pink salmon egg collections would occur in August of 1995 and 1996. Fry releases would occur in late May to early June, 1996 and 1997.

Ladder operation and adult return monitoring would occur through July and August of 1997 and 1998.

Technical Support:

CIAA operates Tutka Hatchery under a contract with ADF&G.

Location:

Paint River is a tributary of Kamishak Bay on the westside of Lower Cook Inlet about 100 miles from Homer, Alaska. Paint River watershed is contained within the expanded McNeil River State Game Sanctuary and the McNeil State Game Refuge.

PROJECT IMPLEMENTATION-

This project should be implemented by CIAA under auspices of ADF&G.

COORDINATION OF INTEGRATED RESEARCH EFFORT-

As fish are allowed into the Paint River watershed, ADF&G biologists will attempt to determine the effects on bear distribution or behavior.

PUBLIC PROCESS-

Through the 15-year history of the Paint River project there have been several workshops and public meetings, public involvement through the Legislative process which expanded McNeil Sanctuary and created the McNeil Refuge, public notice and review through the construction permitting process, public notice through the Alaska Board of Game process and one court action attempting unsuccessfully to prevent fish ladder construction.

Additional public and agency review would occur as State of Alaska fish transport permits and Tutka Hatchery management plan alterations are sought.

PERSONNEL QUALIFICATIONS-

Thomas E. Mears has B.S. and M.S. degrees in Fisheries Science from Michigan State University. Mr. Mears taught fisheries technician training courses at Alpena (Michigan) Community College for 10 years. Mr. Mears has been employed by CIAA as Biologist and as Executive Director since 1979 and is intimately familiar with the Cook Inlet drainage and all relevant salmon enhancement techniques.

PROJECT 95006

BUDGET- Fiscal Year 1995 Budget Summary

Construct Crew Cabin and Fence, Install Grating

Personnel	
Construction Labor	$ 3,800
Travel	0
Contractual Services	
Backhoe and Small Equipment Rental	2,000
Barge Charter	9,750
Boat Charter	750
Commodities	
Cabin Materials	6,800
Miscellaneous	1,000
Bolts and Brackets	1,500
Food	750
Equipment	
Grating (inc. shipping to Anc.)	30,750
Cabin Stove, Lights, Communications, ets	2,500
Fence Materials	12,000
Capital Outlay	0
General Administration (10%)	7,160
Subtotal	$78,760

Pink Salmon Egg Collection

Personnel	
Field Personnel	$21,484
Principal Investigator	11,640
Travel	
Field Personnel	2,021
Principal Investigator	650
Contractual Services	
Air Charter	30,323
Equipment Rentals	1,202
Egg Incubation (in kind donation)	0
Commodities	6,153
Equipment	13,049
Capital Outlay	0
General Administration (10%)	8,652
Subtotal	$95,174
FY 1995 Total	$173,934

Trophics and Community Sructure in the Intertidal and Shallow Subtidal.

Project Number:	95009A
Restoration Category:	Research
Proposed By:	University of Alaska
Lead Trustee Agency:	USFS
Cooperating Agency:	ADFG
Cost FY 95:	$455,418
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2-5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Intertidal and subtidal organisms

INTRODUCTION

Injury to the biological resources of Prince William Sound resulted from the 1989 *Exxon Valdez* oil spill (EVOS), and may be continuing. While some species are known to be recovering, the status of many others remain unknown or are known to be deteriorating. The list of injured biological resources not recovering includes birds, fish, and mammals, as well as both intertidal and subtidal organisms. Injured services include commercial, sport, and subsistence harvests of these non-recovering resources.

The disruption and recovery of community structure is the most pressing issue for research in the nearshore. Most of the non-recovering injured species are predators on nearshore marine organisms. Nearshore resources also provide important breeding or spawning habitat for many injured species. The April 1994 EVOS workshop on research priorities identified seven major hypotheses about processes limiting recovery of nearshore groups of injured resources. Of these seven hypotheses, five were directly related to the trophic structure of nearshore systems. Although the specifics vary, nearshore trophic hypotheses were considered a research priority for nearly all injured/non-recovering resources. The set of research projects proposed here are designed to address these hypotheses by examining variation in, and mechanisms affecting, trophic relationships in the nearshore ecosystem.

Trophic relationships between organisms determine energy flow through a system. These projects therefore share a common focus on major energy pathways. They are designed to examine the regulation of energy pathways in nearshore systems by first, focussing on a large, seasonal and short-lived input of energy into a restricted nearshore area (herring spawn deposition), and second, by examining variation connected to the presence or absence of a dominant predator (sea otters). Each condition is provided by a natural experiment in Prince William Sound. Large, local variation in energy input is provided by spawning runs of Pacific herring. During spawning, a large biomass of herring accumulates along sections of shoreline. Herring defecate and spawn, depositing nutrients and energy into the nearshore area where spawning occurs. Variation in predation is associated with sea otter use of an area, and with herring spawn deposition, as the abundance of food attracts numerous predators on herring and herring eggs, as well as secondary predators on animals attracted by the opportunity to prey upon herring. Herring spawn thus provides a local, intense and repeated disturbance to the system that may be used to trace the roles of nutrient and energy availability, competition, predation, and prey availability in limiting or structuring nearshore dynamics. Local variation in area use by sea otters provides an additional opportunity to examine the role of predation.

These projects examine how ocean circulation, environmental richness (e.g. primary productivity, influx of nutrients, food availability), and predator-prey relationships (e.g. food availability, patch use, grazing pressure, predation risk) interact to limit or structure communities. Regular spawning beaches of Pacific herring receive large, temporally discreet input of nutrients and energy in the form of herring eggs, feces and carcasses, as well as avian and mammalian feces from foragers attracted to the site. Three possibilities are considered for how utilization of such natural localized variation in nutrient and energy supply (e.g. herring spawn) may/may not limit populations in the nearshore. First, abundant localized energy, nutrient, and prey may increase nearshore productivity and diversity through local nutrient enrichment and increased food availability. Alternatively, an abundant supply of nutrients, energy, and food may decrease nearshore productivity and diversity through locally increased predation rates or over-nutrification. Finally, the short-term abundance of nutrients and energy may have limited or no persistent effect because trophic structure is constrained by events not related to local and seasonal super-abundance of energy, nor by the short-term intensity of predation. For example, productivity may be regulated by temperature, or trophic dynamics may determined by the severity of winter weather.

The results of this research will allow an evaluation of the strength of trophic hypotheses in explaining patterns and predicting recovery in the nearshore. Should the data continue to support trophic structure as an important factor in nearshore communities, results from this work should clearly point to specific interactions that are most important, thereby providing information for decisions about the most appropriate restoration activities in nearshore communities. Resource users (e.g. subsistence harvesters) may gain a better understanding of energy limitation, predation, and patterns in the nearshore through the results of this research. With this improved knowledge, they may be better able and more willing to adapt to the fluctuations in nearshore communities, as populations in this habitat continue their recovery from the oil spill and respond to natural fluctuations in the environment.

NEED FOR THE PROJECT

This research is designed to examine how community structure in the nearshore is (or is not) limited by trophic interactions, particularly focused on seasonal energy limitation and the impact of predation. Recovery of the nearshore is no longer believed to be greatly impeded by continued hydrocarbon exposure or toxicity. Rather, ecosystem processes now determine the course of recovery, and the future structure of communities.

The EVOS Trustee Council has identified the disruption and recovery of community structure as the most pressing issue for research in the nearshore. Of hypotheses identified by nearshore researchers at the EVOS Research Priorities workshop (April 1994), most related recovery in the nearshore to trophic issues about community structure. The need has been identified for more information to understand how prey availability, competition, predation, and physical processes influence nearshore organisms. This study uses natural variation in energy and predator abundance in the nearshore to address these information needs.

PROJECT DESIGN

A. Objectives

General Objectives

These projects examine how ocean circulation, environmental richness (e.g. primary productivity, influx of nutrients, food availability), and predator-prey relationships (e.g. food availability, patch use, grazing pressure, predation risk) interact to limit or structure communities. Three general hypotheses will be examined, utilizing natural localized variation in nutrient and energy supply (herring spawn) to examine processes limiting nearshore populations. At regular spawning beaches of Pacific herring, the re-current, large, short-lived input of nutrients and energy (in the form of herring feces, eggs and carcasses and feces of predators attracted by the herring) may:

1. Increase nearshore productivity, standing biomass, and diversity through local nutrient enrichment and increased food availability;

2. Decrease nearshore productivity, standing biomass, and diversity through locally increased predation rates or over-nutrification, or;

3. Have limited or no persistent effect on local communities because trophic structure is constrained by events not related to local and seasonal super-abundance of energy, nor by the short-term intensity of predation (e.g. productivity may be regulated by currents; trophic structure may be constrained by seasonal energy shortages in winter).

This set of interrelated studies will examine these specific hypotheses about the impact of energy influx and predator abundance as a means of addressing three more general hypotheses formulated at the EVOS Research Priorities workshop (April 1994). These three are

(numbered as in J. Bodkin, 'Report on results of nearshore working groups...') #1, Competition/predation, #4, Limited prey, and #5, Predation. Two other trophic-related hypotheses (#2, recruitment, and #6, indirect toxicity) are not specifically addressed here, but depend upon trophic relationships in the nearshore. Hence, information collected by these studies should be of use in evaluating these hypotheses.

It will not be possible to evaluate these hypotheses related to herring spawn based on a single year of data. For this reason, a 3-5 year study is proposed. A preliminary evaluation of the first hypothesis is scheduled to be available in the first year. Preliminary results for the second and third hypotheses will be available only in later years.

Objectives for 1995

The following specific objectives will be achieved for 1995:

1. Identify specific sampling sites based on site visits and criteria listed below (Methods).

2. Design interdisciplinary nested sampling schedules to examine site characteristics at several scales.

3. Within each focal study site, and following the nested sampling design, seasonally measure (FY95 spring and summer) local availability of substrate types, sunlight, nutrients, primary productivity, and detrital influx. We will also attempt to coordinate with SEA and forage-fish oceanography studies to obtain local measures of oceanographic patterns.

4. Within each focal study site, and following the nested sampling design, seasonally measure (FY95 spring and summer) abundance and distribution of specific intertidal and shallow subtidal organisms including dominant algae, sea grasses, invertebrates, and vertebrate foragers, and nearshore plankton.

5. Use measures in objectives 3-4, in conjunction with ADFG and SEA program measurements of herring spawn abundance, biomass, distribution, and duration to begin a preliminary evaluation of the hypotheses above.

B. Methods

Specific methods for each study are given in the project descriptions. However, a general approach to study sites and sampling designs common to all projects is laid out here.

Study sites will be stratified by the presence/absence of use by herring or sea otters, and by sampling scale. Sites will be matched by location in the Sound, exposure, and general characteristics. Two pairs of sites will differ in historical use by herring for spawn deposition. Candidates for these two pairs are northern Montegue Island paired with northern Green Island; and Bidarki Point paired with southern Bligh Island. Northern Montegue and Bidarki Point are the most consistent sites of herring spawn deposition over the past ten years. Nearby

Green Island and Bligh Island beaches have received little or no spawn during the same period. Bidarki Point and Bligh Island are located near the village of Tatitlik. We will explore opportunities at these sites for sampling designed around subsistence users and issues (e.g. factors influencing the abundance of octopus). A fifth site with low sea otter density (Herring Bay) will be matched with northern Montegue/Green Islands, which currently have a high otter density. Herring Bay, Green Island and northern Montegue Island also have been the site of past and ongoing EVOS research. Substantial background data is therefore available for these sites.

Foragers in the nearshore range from sessile filter feeders to deposit feeders and grazers to highly mobile predators. These organisms move over daily or seasonal feeding ranges that vary in size by many orders of magnitude. It is therefore necessary to explicitly consider scale and foraging range when examining the nearshore system. We recognize two general classes of feeders: sessile organisms (e.g. filter feeders, some grazers and detritivores) that move slowly or not at all and feed over a small area (a few cubic centimeters to a few square meters); and mobile organisms (e.g. seastars, crabs, octopus, otters, birds) that may forage over areas from hundreds of square meters to many square kilometers. While this particular distinction is artificial, it recognizes a real difference in the scale at which organisms relate to their environment, and provides a biologically relevant framework for a spatially-nested sampling design. Further detail on spatial nesting of design are provided in the individual project descriptions.

C. Schedule

Scheduled milestones for projects are included in each project description. In general, all projects will hold to the following schedule:

Winter '95: Personnel selection and equipment procurement. Site visits and site selection, sampling design, preliminary tests of experimental protocols.
Spring '95: Preparation of proposals for FY96. On-site sampling at all sites; intensive work at herring spawn sites.
Summer '95: On-site sampling at all sites; preliminary examination of data.

D. Technical Support

See individual project descriptions for details on technical support.

E. Location

This work will be conducted in Prince William Sound. Specific focal sites under consideration are northern Montegue Island, northern Green Island, Bidarki Point, southern Bligh Island, and Herring Bay. Reasons for this choice of study sites were presented under Methods.

PROJECT IMPLEMENTATION

This project should be implemented by the U.S. Forest Service through the various cooperating agencies.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project involves the coordination of several research studies under this umbrella proposal. The projects are coordinated by common themes, techniques, sampling sites, and logistics. Coordination to date has been achieved through periodic workshops, and will continue both on sampling sites and via further face-to-face interactions.

We will also be coordinating data sharing with SEA and possibly forage fish/pelagic predators research projects. Collaboration with SEA will involve at least oceanography (D. Salmon, P.I.), herring projects (J. Wilcock, E. Brown, P.I.s) nearshore fish (G. Thomas, P.I.), and avian predation on herring spawn (M.A. Bishop, P.I.).

FY 95 BUDGET ($K)

Personnel	21.3
Travel	12.3
Contractual	335.0
Commodities	1.0
Equipment	10.0
Subtotal	379.6
Overhead (@20%)	75.8
Total	455.4

Primary Productivity as a Factor in the Recovery of Injured Resources in Prince William Sound

Project Number:	95009B
Restoration Category:	Research
Proposed By:	University of Alaska
Lead Trustee Agency:	USFS
Cooperating Agency:	ADFG
Cost FY 95:	$218,850
Cost FY 96:	$213,000
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Intertidal and subtidal organisms

INTRODUCTION

This project will investigate the production and flow of fixed carbon in the nearshore ecosystem of Prince William Sound and will determine the importance of benthic primary productivity in the recovery of injured intertidal and subtidal species. Results from this project would lay the foundation for understanding how fixed carbon is moved through the Prince William Sound nearshore system, and how this carbon flow is altered by seasonal events. The study will determine the relative importance of carbon input from phytoplankton, benthic production, terrestrial plants, and episodic transport (eg herring spawn). Understanding the flow of carbon will increase our understanding of factors that limit recovery of nearshore organisms.

The results of the study will give information on the relative importance of the various sources of carbon that are introduced into the nearshore system. Importance is measured by the relative abundance of each source of carbon present in the higher trophic organisms. Information will also be generated on how these proportions change seasonally and how they are affected by physical and chemical processes.

From the above information it may be possible to estimate the relative importance of the various plant communities in supplying the nearshore invertebrate community with carbon.

Further, a model could be created to predict the disturbance to a community if there are changes in the normal flow of carbon into the system. Such disturbances could be effected by oil spill treatment, El Nino events, winter storms, etc.

As a component of the multidisciplinary nearshore ecosystem study, "Trophics and community structure in the intertidal and shallow subtidal", this study will provide information on the availability and stable isotope values of various primary producers within the nearshore ecoystem. This proposal will provide the foundation for collaborative studies of higher trophic levels, such as the role of invertebrates in community structure and the role of mobile predators in the nearshore environment.

NEED FOR THE PROJECT

Injury to the biological resources of Prince William Sound as a result of the *Exxon Valdez* (EVOS) oil spill have been documented since 1989. Although recovery has occurred for many species and is progressing for others, many injured resources have been listed as not recovering. The range of such injured and not recovering species includes bird, marine mammals, fish, and both intertidal and subtidal organisms.

One hypothesis for the lack of recovery for injured species is that recovery is limited by food/prey availability. Most of the injured species from the higher trophic levels (birds, fish, mammals) are predators on nearshore, marine organisms. These nearshore organisms make their living as predators themselves, as scavengers, as grazers, and/or as suspension/deposit feeders. The ultimate source of carbon/energy for all of these organisms is from primary production. In the nearshore there are four possible sources for carbon: the first three are primary production from terrestrial plants, benthic marine plants and phytoplankton, and the fourth is episodic transport of carbon. Benthic plants (seaweeds and marine grasses) provide carbon for grazers, such as littorines, urchins, and limpets. These organisms in turn serve as food for higher trophic level organisms. Populations of many of these grazers have been altered by the EVOS. Phytoplankton and organic detritus (along with zooplankton) provide carbon for suspension and deposit feeders, such as barnacles, mussels, and clams. The relative importance of these forms of carbon depend on the organisms and area of concern, but contributions from both phytoplankton and benthic plants may be important. Carbon production provided by terrestrial plants will be important in nearshore areas in the vicinity of streams and rivers. Episodic transport could bring in carbon from areas outside of the nearshore system. Two examples of this type of transport are the annual Pacific herring spawnings in the spring and the salmon runs in the summer and fall.

A decline in primary productivity in PWS as a direct or indirect effect of the oil spill could explain the lack of recovery of some injured resources. For example, sea otters may have less prey, which feed on seaweeds, available in an area where benthic production has been depressed as a result of the spill.

This project proposes to look at primary production as one aspect of an ecosystem approach to understanding recovery of the biological resources. The general approach is to determine the relative contributions of the various sources of production into the nearshore system and also to determine whether this pattern has been altered in areas affected by the oil spill and treatment.

PROJECT DESIGN

A. Objectives

1. To determine the productivity and standing biomass of benthic marine plants in the nearshore.

2. To determine the productivity and biomass of phytoplankton in the nearshore.

3. To determine the organic input to the nearshore from terrestrial sources

4. To determine the relative contribution of these sources of carbon to the carbon budget of higher trophic level organisms.

5. To determine what factors may limit primary productivity in the nearshore.

B. Methods

About four to six sheltered rocky sites in PWS will be selected based on intertidal and subtidal vegetation and associated communities. Areas of use by higher trophic level organisms such as sea otters, herring and birds will be targeted, if possible. Site selection will be coordinated with the nearshore study groups of the National Bioilogical Survey (NBS) and University of Alaska (UAF).

Primary productivity will be measured by C-14 fixation *in situ*. Productivity will be normalized both by chlorophyll content and by biomass. Determinations will be made during the period of algal blooms for phytoplankton and at quarterly intervals for benthic algae and eel grasses. Extrapolations will be made to determine the total productivity for the system on an annual basis. Water chemistry for the determination of nutrients will be performed on samples taken in and near to the selected sites. Light irradiance data will be collected as often as feasible for correlation with productivity rates

Streams that flow into the nearshore area will be sampled for total organic carbon four times during the year. Stream flow rates and capacities will be estimated in order to estimate the total carbon input from this source.

Stable carbon isotope ratios can be used to determine the source of primary productivity used by various organisms. Nitrogen isotopes can be used to look at differences in trophic feeding.

Isotope ratios will be determined for the sources of carbon including phytoplankton, benthic seaweeds, detritus, particulate and dissolved organic matter and herring eggs. Additionally, stable isotope ratios (C and N) will be determined for several different organisms which use different feeding strategies. Such organisms will include a grazer, suspension feeder, detritus feeder and predator. Isotope ratios will be compared to those from the sources of carbon. The isotope ratio will be determined throughout the year in order to determine seasonal variation in feeding strategies and relative importance of carbon sources. This aspect of the study will be closely coordinated with the invertebrate and mobile predator trophic interaction studies proposed by NBS and UAF.

C. Schedule

Spring/95	Site selection.
June/95-June 97	Sampling for photosynthesis, nutrients, light levels and isotope ratios. These will be done four times a year at quarterly intervals. One sampling date will coincide with the spring algal bloom in March.

Data compilation and analysis will be on-going through the year. There should be a minimum of two years of sampling for estimation of year to year variation. Annual reports will be submitted by April of each year.

D. Technical Support

Laboratory analysis of stable isotope samples and CHN samples will be required.

E. Location

Field work will take place near and at selected sheltered rocky sites in Prince William Sound. Laboratory analyses will be done at the University of Alaska, both at Fairbanks and at the Juneau Center, School of Fisheries and Ocean Sciences.

PROJECT IMPLEMENTATION

This project should be implemented by the U.S. Forest Service through the various cooperating agencies.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is designed to be closely coordinated with nearshore food web studies of University of Alaska Fairbanks and the Prince William Sound Science Center, and with the nearshore trophic studies proposed by the National Biological Survey. Collaboration will occur with the SEA study through oceanography, herring projects, nearshore fish and avian predation. This

study will provide information to other studies concerning how fixed carbon is routed to the nearshore organisms.

FY 95 BUDGET ($K)

Personnel	141.0
Travel	11.4
Contractual	7.2
Commodities	16.3
Equipment	6.5
Subtotal	182.4
Gen. Admin.	36.5
Total	218.9

Community Structure of Mobile Foragers Using the Nearshore

Project Number:	95009E
Restoration Category:	Research
Proposed By:	USFS
Cooperating Agency:	ADFG
Cost FY 95:	$280,500
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2-5 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

Intertidal and shallow subtidal habitats provide important resources to many species and services injured in the *Exxon Valdez* oil spill (EVOS). At higher trophic levels, species using these habitats depend on nearshore marine organisms as prey resources. For example, juvenile fish, sea otters, harlequin ducks, and humans all feed on resources in the nearshore. Understanding changes in nearshore communities and the trophic structure of these communities has been identified as a research priority by the EVOS Restoration Office and is the focus of five hypotheses developed by the Nearshore Working Group.

This study is a component of the proposed program "Trophics and community structure in the intertidal and shallow subtidal (TCSISS)". It specifically addresses TCSISS hypotheses regarding the role and intensity of predation by mobile foragers in trophic food webs. The community of mobile nearshore predators includes birds, mammals, fish, and some invertebrates such as crabs and octopus. Three questions will be addressed in this context: First, what characteristics of the nearshore environment provide suitable foraging habitats for mobile intertidal foragers? Second, how effectively do foragers use these habitats? That is, what are the relative foraging efficiencies of mobile foragers, particularly birds. Third, what is the intensity of habitat patch use by these foragers and how are variations in habitat use reflected in the community structure, productivity or abundance of their prey?

This study is focused on avian and mammal foragers in the nearshore. Some work on invertebrates will be conducted in conjunction with the TCSISS projects "Survey of octopuses" and "Trophic dynamics and energy flow" where techniques in this project are applicable. Fish will not be not considered here because the techniques we plan to use are not suitable to also sample fish habitat use.

Mobile foragers in the nearshore may have a large effect on distribution and abundance of their prey. High predation intensity can deplete the abundance of preferred prey, sometimes resulting in dramatic changes in primary and secondary production, trophic structure, and predator populations in the nearshore ecosystem. Dramatic changes in the availability, distribution or density of prey can also impact predator populations. Predator response can include prey switching (that may in turn adversely effect alternative prey), changes in habitat or patch use, and changes in population size or growth rates.

Hence, understanding the patterns of foraging and habitat use of intertidal mobile foragers is necessary to predicting and facilitating the recovery from EVOS injury of these foragers and of their intertidal and subtidal prey. This project will provide information on the relative intensity of habitat use, and provide insight to the factors influencing use of the intertidal and shallow subtidal by an important group of nearshore foragers.

NEED FOR THE PROJECT

This project is designed to examine how community structure in the nearshore is (or is not) impacted by the community of mobile predators that forage in intertidal and shallow subtidal areas. This group of predators includes several injured species (harlequin ducks, marbled murrelet, sea otters, black oystercatchers, bald eagles, and river otters) that feed on other injured resources (pacific herring, intertidal and subtidal organisms). This community of predators and prey contribute to injured services including commercial fishing, tourism, subsistence and passive use.

Seven major hypotheses about processes limiting recovery of nearshore groups of injured resources that were identified at the EVOS research priorities workshop. Five hypotheses are directly related to the trophic structure of nearshore systems. Of these five, three (competition/ predation, limited prey, predation) hypothesize that predator-prey relationships, as described by prey choice, patch or habitat use, and population regulation, may limit recovery of resources in the nearshore. This study will provide information designed to begin to test these and related hypotheses about community processes in the nearshore.

PROJECT DESIGN

This project is designed with three objectives: first, to identify critical habitat components for the community of mobile foragers in the intertidal ecosystem (primarily birds and some

mammals); second, to measure the relative foraging efficiencies of species feeding in mixed-species aggregations; and third, to measure intensity of patch use at the study sites and estimate the general impact of these species on intertidal habitats.

These objectives relate directly to testing the three TCSISS hypotheses. Identifying critical components of habitat for foragers in the nearshore will be necessary to evaluate how the hypothesized increase in productivity from energy and nutrient input (herring spawn) affects mobile forager diversity. Relative foraging efficiencies can be used to indicate the importance of competitive versus predation effects on communities. Finally, patch use intensity and the general impact of predation must be known to examine the hypothesis that local intense predation limits nearshore recovery.

Milestones for 1995

Critical habitat components:

1. Record characteristics of habitat patches, including location, substrate type, and dominant sessile organisms (e.g. sea grasses, algae, mussels) at chosen study sites.

Relative foraging efficiencies:

2. Sampling seasonally within each site, record size and composition of foraging aggregations observed in nearshore habitats. For aggregations persisting less than several hours, record arrival and departure sequence of foragers. Within aggregations, sample behavior to measure capture rates for avian diving foragers that regularly bring prey to the surface (for sea otters, foraging behavior will be assessed in another project in "Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound").

3. Test experimental feeding trays as a method to measure relative efficiencies, costs, and risks associated with foraging.

Survey patch use:

4. Within each study site, seasonally survey the abundance and distribution of specific birds and mammals using intertidal and shallow subtidal habitats.

5. Examine data collected under Milestones 1-4 to provide a preliminary characterization of important habitat components, foraging efficiencies and intensity of habitat use.

It will not be possible to fully characterize use of nearshore habitats by the community of mobile predators based on a single year of data. For this reason, a 2-5 year study is proposed. A preliminary evaluation of the data will be available following the first year.

B. Methods

Characteristics of habitat patches:

Broad category shoreline sensitivity indices will be obtained from an existing GIS data base. In

combination with sampling efforts of other TCSISS projects, shoreline habitats at each study site will be mapped by boat and (where appropriate) foot surveys at low tide. Substrate, physical features, and dominant plant and sessile animal populations will be noted.

Size and composition of foraging aggregations: Foraging aggregations will be observed from a small boat, or from shore. All foragers present (including potential secondary predators on foragers) will be counted and identified to species if possible, or to species group, and foraging behaviors noted. Some aggregations will also be videotaped for later counting to check on-site estimates and to allow focal-animal sampling of feeding behaviors. Repeated counts throughout the observation period will be used to record arrival and departure sequence.

Feeding trays: Feeding trays containing sieved substrate and a known amount of food items will be placed at sampling stations. Three trays will be used at each station, placed in a line perpendicular to the shoreline, at fixed distances from shoreline cover. Trays will be left in place for approximately one-half tidal cycle (from the retreat of the tide at the lowest tray until its return at that site). Presence and species of foragers visiting each tray will be recorded from tracks in the tray. Tray contents will be sieved at the end of each trial. Remaining food items will be recovered and weighed. Similar techniques have been successfully used to measure bird and mammal feeding efficiencies, but this technique has not yet been tested on intertidal foragers.

Survey: The relative abundance and species composition of birds and marine mammals foraging in the nearshore will be documented using shoreline transects. Nearshore boat transect surveys will be conducted both at low and high tide along a 15-km length of shoreline. Transect width will extend from the shoreline seaward to 120m. Shorelines will be divided into transects based on habitat types (see above) and natural landmarks. Data collected will include: location, number and species (or genus), shoreline type, foraging behavior, and habitat (land, water, or air). Transects will be surveyed using methodologies as in 94320-Q SEA: Avian Predation on Herring Spawn (adapted from USF&WS marine bird and mammal surveys, 1993).

C. Schedule

Nov-Dec 94: Personnel selection and equipment procurement. Preliminary site visits if feasible depending on funding date.
Winter 95: Site visits and site selection, preliminary tests of experimental protocols. Initial field sampling.
Spring 95: Preparation of proposals for FY96. On-site sampling at each site; intensive foraging observations and transect surveys. Feeding tray experiments at each site.
Summer 95: On-site sampling at all sites; preliminary examination of data.
Fall 95: Continued sampling at all sites; data analysis and write-up begins.

D. Technical Support

None

E. Location

This work will be conducted in Prince William Sound. Specific focal sites under consideration are northern Montegue Island, northern Green Island, Bidarki Point, southern Bligh Island, and Herring Bay. Reasons for this choice of study sites are presented in a cover document "Trophics and community structure in the intertidal and shallow subtidal".

PROJECT IMPLEMENTATION

This project should be implemented by the U.S. Forest Service and should be conducted by the Copper River Delta Institute (CRDI) and Prince William Sound Science Center. This project is closely related to and builds on work conducted by Mary Anne Bishop at CRDI (94320Q SEA: Avian Predation on Herring Spawn). The theoretical basis for work proposed here developed from Science Center staff's (D. Scheel, PI and T. Vincent, PI) past work and interaction with colleagues (e.g. Vincent, Scheel, Brown & Vincent. In prep. Tradeoffs and coexistence in consumer-resource models: it all depends on what you eat.).

This work will utilize data from work proposed under both the SEA program and Pelagic Predator project. Close interaction and access to SEA researchers and data make the Copper River Delta Institute and the PWS Science Center an appropriate choice.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is part of the Trophics and community structure in the intertidal and shallow subtidal (TCSISS) integrated study program. It also is designed with input from the SEA program, and the Pelagic Predators work group and complements research proposed within those groups. Both PIs of the proposed work has been and will continue to be active participant in SEA and EVOS Trustee meetings to integrate research.

FY 95 BUDGET ($K)

	USFS	PWSSC
Personnel	80.4	78.4
Travel	3.5	4.6
Contractual	1.5	8.7
Commodities	10.9	11.1
Equipment	26.0	18.9
Subtotal	122.3	121.7
Indirect Costs	12.2	24.3
Total	134.5	146.0

Intertidal Fauna and Flora Species Composition, Abundance and Variability Relative to Physical Habitat Controls

Project Number:	95010
Restoration Category:	Research
Proposed By:	Megan N. Dethier, University of Washington Carl Schoch, Oregon State University
Lead Trustee Agency:	DOI
Cost FY 95:	$75,000
Cost FY 96:	$0
Total Cost:	$75,000
Duration:	1 year
Geographic Area:	Katmai National Park and Preserve
Injured Resource/Service:	Intertidal organisms

INTRODUCTION

In April, 1989 the National Park Service contracted intertidal ecologists to conduct pre-assessments of park shorelines that seemed to be in the path of the oncoming *Exxon Valdez* oil spill. The task was daunting since the shoreline was tremendously variable in biological assemblages and it was uncertain where the oil would contact shore. The intertidal algae and fauna were surveyed at 16 sites for potential baseline information on the pre-oiled intertidal communities. With little knowledge of the shoreline, the sites were picked arbitrarily based on accessibility, substrate type, relocation, and replication along exposure gradients (strictly for the purposes of determining pre-oiled conditions). The oil, however, only stranded sporadically along the Kenai Fjords and Katmai coasts, and none of the surveyed beaches was contaminated. Thus, although important information was gathered on a coast with virtually no baseline data, the objective of establishing a pre-oiled condition was not accomplished because no method existed to compare the surveyed sites to the oiled sites.

In the years since the spill, we have developed a procedure to link specific intertidal fauna/flora communities to physical habitats. This has significant application to the coast of Alaska, which has sparse biological transect data but, in some areas, considerable geomorphological information. With comprehensive geomorphological data now available for much of the spill area, statistical inference can be made from a limited series of biological transects to a broader

area. The results of the study outlined by this proposal will:

1. Provide information to quantify habitat disruption.

2. Define the spatial extent and spatial relationships of disrupted and of recovering intertidal communities.

3. Provide information to determine the rate of recovery and to aid in the determination of when recovery is complete.

4. Provide information on the mechanisms responsible for variations in recruitment, growth, condition and survival of intertidal communities.

5. Fill the gaps in current knowledge about the spatial distribution of intertidal communities, the seasonal variation of abundance, and how to monitor the long term productivity level of intertidal lands.

This proposal provides a systematic methodology for using available information to determine key relationships in the ecosystem that are important for injury and restoration assessment. Under the research strategies outlined by the Oil Spill Trustee Council in the Invitation to Submit Restoration Projects for Fiscal Year 1995, this proposal addresses the priority ecosystem issue of "Disruption of Nearshore Community Structure". This study will first identify fauna/flora assemblages within specific habitat types (as defined by geomorphology) in each of three intertidal zones for geomorphologically homogenous beach segments. The proposed procedure has evolved from 4 years of field work in Cook Inlet and the Gulf of Alaska on National Park shorelines. The methodology was refined and tested in Puget Sound during the spring of 1994 (Schoch et al, in review), and in the summer of 1994 will be applied to the Cook Inlet shorelines of Lake Clark National Park. The proposed study will incorporate rigorous statistical analyses to aid in defining community linkages to beach types in healthy habitats. The results of these analyses can be used to compare community structure of healthy beaches with injured beaches, ultimately for the purpose of determining recovery rates and the point of complete restoration. With a better understanding of intertidal community structure and the variability of these communities with varying physical constraints, the mechanisms controlling recovery can be examined including the effects of predation, physical habitat type, recruitment, etc.

NEED FOR THE PROJECT

Research to date in Alaska on population level injury for intertidal communities has been patchy and inconclusive due in large part to the huge spatial variation in communities. This project will begin to quantify that variation. The results can be used to determine the extent of damage, the degree of this disruption, and the degree of recovery over broad spatial scales. Intertidal community structure is difficult to determine quantitatively because of the tremendous spatial variability of intertidal organisms and the logistical complications of multiple replicates.

Past and proposed restoration projects have used *Fucus* spp. as an indicator/proxy of intertidal community health and recovery. However, the recovery of intertidal communities must be based not on the abundance of one species such as *Fucus* spp. as proposed, but rather on abundance and spatial distribution of the entire community. Further, each intertidal zone should be analyzed for recovery and this cannot be done using an indicator species generally restricted to the upper intertidal zones of semi-protected shores, such as *Fucus* spp. Therefore, a systematic methodology for determining the distribution and abundance of intertidal organisms on a large spatial scale is needed to answer questions related to recovery. Although research issues concerning habitat are not considered a high priority for fiscal year 1995 funding, we believe that natural resources (community structure) issues cannot be divorced from the habitats that support them.

Therefore, in order to address questions of natural resource recovery and community structure, basic relationships with habitat must be determined first. The extent of disruption to community structure and the recovery of this structure can then be analyzed for determining the extent of injury and recovery rates. As indicated in the Invitation to Submit Restoration Projects, the determination of disruption to intertidal community structure is a high priority due to the direct linkage to sea otters, salmon, and other high trophic level organisms. The basis of the proposed work is a detailed, 32 parameter, vertical (i.e. separated into each intertidal zone) and horizontal description of shoreline geomorphology for each homogenous beach segment (i.e. geomorphologically the same in the horizontal dimensions). This shoreline model was developed over the past 4 years for habitat sensitivity and stranded oil persistence analyses, and has been applied to the shorelines of Kenai Fjords, Katmai, Aniakchak, and Lake Clark National Park Units. We propose to develop statistical linkages between beach types defined by this model and a broader vision of natural resources (i.e. community structures) determined by existing transect data (augmented if necessary by additional fauna/flora surveys) so that inference for abundance and distribution can be made to broader geographic regions. These statistical inferences can then be used to track the recovery of injured beaches in comparison to healthy beaches, as well as to establish a database relating habitat sensitivity to intertidal community structure. With large scale information on the abundance and distribution of intertidal organisms, important questions regarding injury, recovery and the effects of intertidal resources on higher trophic level organisms can be addressed.

PROJECT DESIGN

A. Objectives

1. Identify intertidal natural resources and community structures for specific beach types, including species composition, abundance, and variability.

2. Identify the spatial distribution, both vertical and horizontal, of beach types within a specified project area.

3. Identify the degree of disruption of resources and their services by statistical comparison

of healthy beach communities (species composition, abundance, and variability) to the communities of injured and recovering beaches.

B. Methods

1. Identify project area.
There are several possibilities depending on the priorities of the restoration committee. The field work for Katmai National Park, Aniakchak National Monument, and Lake Clark National Park is 70 % complete, and for Kenai Fjords National Park the field work is about 20% complete (all data available from the National Park Service, Coastal Programs Office). Significantly more work is required for the remainder of the spill area where only partial horizontal descriptions have been completed (available from ADEC). Therefore, although the Alaska Peninsula is not a high priority restoration area, this would be the most economical place for this study since the work is significantly more complete. Other areas, such as Prince William Sound would require additional geomorphological field work to augment existing information, although this could be accomplished if deemed desirable by the Oil Spill Trustee Council (the schedule and proposed budget would have to be adjusted for this additional and/or alternative work). Assuming the selection of the Katmai shoreline for the first year effort, this work is the closest to completion and only 6 weeks of additional geomorphological field work are anticipated to complete the coverage of the 400 mile shoreline. Biological transects may require additional time with consideration of the spring tide cycles.

2. Map project shoreline.
Using digitized low altitude aerial photography (available from the National Park Service and Walker Associates) for basemaps, the homogenous shoreline segment information (32 parameters for each shoreline segment defining each horizontal and vertical unit) will be entered into a relational database.

3. Statistical analysis of beach segments.
Beach segments will be clustered into groups with similar geomorphological and physical characteristics.

4. Develop linkages between fauna/flora communities and beach types.
Using existing fauna/flora transect data (available from the National Park Service, ADEC, and Exxon) and augmenting this information with additional transect work on randomly selected beach segments, natural resources will be related to habitat types using analysis of variance (ANOVA) or multi-variate correlation (CANOCO).

5. Analysis of intertidal resources disruption.
ANOVA comparisons between healthy beach communities and injured or recovering beach communities will indicate the extent of current disruption. Replicate analyses will indicate the rate of recovery.

C. Schedule

October 1, 1994 - May 1, 1995
The compilation of the geomorphological and physical parameters into a relational database can begin immediately (i.e. October 1, 1994). Digitizing the aerial photography and compiling the digital base map can also begin immediately. Statistical analyses of beach segments and group clustering of homogenous units can be completed before the 1995 field season.

June 1, 1995 - August 31, 1995
The field season will be used to complete missing geomorphological information, and to complete missing fauna/flora transect information. The total number of field days will be determined by the extent of the missing information (anticipated not to exceed 90 days).

September 1, 1995 - November 30, 1995
This period will be dedicated to data analysis and report writing.

D. Technical Support

Digital database development will be conducted at Oregon State University using ERDAS and a relational database software such as Paradox or Oracle. Field work will require vessel support, however the size and sophistication will depend on funding, ranging from kayaks and shore camping to a full support facility. Laboratory analysis of field samples (if any) will be conducted at the Friday Harbor Laboratories, WA. Data transfer and archiving procedures are negotiable.

E. Location

Other project locations can be considered, based on funding level, restoration priorities, and logistical considerations.

PROJECT IMPLEMENTATION

By design, this proposal is intended to be implemented by the principal investigator with the assistance of state and federal agencies such as the National Park Service Regional Office, Katmai National Park and Preserve, National Biological Service, Alaska Department of Natural Resources, Alaska Department of Environmental Conservation, etc.

COORDINATION OF INTEGRATED RESEARCH EFFORT

A lot of data has been gathered since the 1989 spill by state, federal and private entities. The first step is to aggregate existing information from the National Park Service, state agencies and private entities. Any collaborative partnership facilitating this project will be considered. This project can be coordinated with other funded projects particularly those implemented by the

University of Alaska, Alaska Department of Fish and Game, and the Alaska Department of Environmental Conservation.

FY 95 BUDGET ($K)

Personnel	35.0
Travel	1.5
Contractual	21.0
Commodities	1.0
Equipment	3.5
Capital Outlay	5.0
Subtotal	67.0
Gen. Admin.	6.5
Total	73.5

A Tribute to Prince William Sound

Project Number:	95016
Restoration Category:	General Restoration (new)
Proposed By:	Gary Kremen 3605 Arctic Blvd., #2777 Anchorage, AK 99503 (602)991-2405
Lead Trustee Agency:	USFS
Cost FY 95:	$161,000
Cost FY 96:	$0
Total Cost:	$161,000
Duration:	1 year
Injured Resource/Service:	Recreation and tourism

INTRODUCTION

The injured service the project would address is tourism. The proposal is to work in conjunction with the Prince William Tourism Coalition. First to determine through public discussion what areas and recreational activities should be pinpointed. Secondly, to formulate a scheduled tour for the exhibit "A Tribute to Prince William Sound." That schedule will include various national trade shows, whereby the exhibit would promote tourism in the specified areas and concerns of Prince William Sound.

The exhibit valued at $147,000 has already been completed and has received much national and international attention.

Recovery of tourism will also occur when more people are made aware of the beauty that yet remains in the Prince William Sound area. This can be done by taking the exhibit to key high profile showings and distributing promotional material regarding the area. The exhibit already has a superb track record of generating much T.V. and press coverage wherever it has been exhibited.

PROJECT DESIGN

A. Objective

Performing as a sounding stage at key exhibitions throughout the United States, enticing people to come visit this area. The exhibition will be held at trade shows where people have the funds to travel to Prince William Sound.

B. Methods

Showing the exhibit "A Tribute to Prince Williams Sound," which generates much interest, T.V. and press and dispersing various printed material regarding tourism in Prince William Sound.

C. Schedule

The exhibit has already been completed at a value of $147,000 and has a successful proven track record. It is ready to go back on tour at any time as per an exhibition schedule is worked out in conjunction with the Prince William Sound Tourism Coalition.

D. Technical Support

Technical support would come from The Prince William Sound Coalition, which would determine the necessary promotional material to disperse and what areas of Prince William Sound should, and could be promoted for tourism.

PROJECT IMPLEMENTATION

The project could be implemented through The Prince William Sound Tourism Coalition, or the Alaska Tourism and Marketing Council, or the Alaska Department of Tourism.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The project would be coordinated with Alaska's Department of Tourism and the Alaska Tourism and Marketing Council. For instance, where and when these entities gear their promotional drives to certain locations throughout the United States is where the exhibit tour would key.

FY 95 BUDGET ($K)

Personnel	60.0
Travel	25.0
Contractual	55.0
Commodities	0.0
Equipment	6.0
Overhead	15.0
Total	161.0

Port Graham Coho Salmon Subsistence Fishery Restoration Project

Project Number:	95017
Restoration Category:	General Restoration (new)
Proposed By:	David Daisy
Lead Trustee Agency:	ADFG
Cost FY 95:	$587,900
Cost FY 96:	$0
Total Cost:	$587,900
Duration:	1 year
Geographic Area:	Port Graham, Alaska
Injured Resource/Service:	Subsistence

Objectives

The goal of this project is to restore the Coho salmon subsistence fishery in Port Graham from its current harvest level of around 350 to its historic annual harvest level of around 2,000.

Methods

This goal will be achieved by creating an annual return of 6,000 Port Graham River coho to the salmon hatchery in Port Graham. A return of this size to the village hatchery will provide a subsistence harvest at the historic 2,000 level, 500 for broodstock and a cost recovery harvest of around 3,500 to pay those hatchery operating expenses that are directly related to this project. Using the standard ADFG survival assumptions, 150,000 hatchery produced coho smolt will be needed to generate a return of 6?000 adults. At a final smolt loading density of 20 kilograms per cubic meter (kg/m3) in the raceways and a total water exchange of 2 times per hour (R2), approximately 2,300 liters per minute (lpm) of high quality fresh water will be needed. Currently the hatchery has only 1,100 lpm for this project. The additional 1,200 lpm will need to be developed. A water source has been identified and an engineering study done to determine the cost of bringing this water into the hatchery.

In addition to the extra water, the project will need a separate module set up in the hatchery for the coho with its own set of incubators and raceways.

Developing the additional water for the hatchery will need to be done under a construction contract. The raceways and incubators will be built at the village welding shop. The construction of the coho module, installation of the incubators and raceways, etc. will be done by the hatchery staff.

Schedule

Oct 1 94 to Feb 28 95	Final design and permitting
March 1, 1995	Water project put out for bid; hatchery module materials ordered
March 20, 1995	Begin building incubators and raceways
March 30, 1995	Bid awarded for water project
May 1, 95 to Sep 15, 95	Water project under construction
June 1, 1995 to July 15, 1995	Construction on hatchery module

FY 95 BUDGET ($K)

Personnel	23.0
Travel	0.0
Contractual	496.7
Commodities	21.3
Equipment	46.9
Total	587.9

Foraging Efficiencies at Temporary Food Patches

Project Number:	95022
Restoration Category:	Research
Proposed By:	Prince William Sound Science Center
Lead Trustee Agency:	DOI
Cooperating Agencies:	ADFG
Cost FY 95:	$183,100
Cost FY 96:	$147,200
Total Cost:	Unknown
Duration:	2 or more years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

Populations of several bird and mammals species, particularly those that feed on fish in pelagic areas, have declined over the past twenty years. Recent EVOS Trustee sponsored workshops, as well as regional conferences (e.g., Is It Food? 1993), focused on the hypothesis that changes in food availability are responsible for these population declines, or prevent the recovery of populations following mortality from the *Exxon Valdez* oil spill. Testing of this hypothesis has been identified as a research priority by the EVOS Restoration Office.

A change in the abundance, composition, or distribution of prey will be reflected in the efficiency with which animals forage. Foraging efficiency refers to the ability of an animal to gather food from the environment: more efficient foragers can feed profitably at food availabilities too low for less efficient foragers. Marine birds and mammals often depend on food that occurs in rich, temporary patches. For example, the spring spawning of herring attracts large aggregations of predators such as humpback whales, sea lions, gulls, shorebirds and other birds that prey on both adult herring and herring eggs. Other examples include predators attracted to schooling fish or to salmon fry out-migration. The relative foraging efficiencies of species that feed on the same or similar prey can be measured in the field through studies at feeding sites.

A concentration of vulnerable prey attracts many foragers. However, as predators feed, the prey is depleted or becomes more difficult to capture. Rich patches also attract predators such as bald eagles that may prey upon animals aggregated to utilize the food source, thereby further decreasing their ability to feed efficiently. For these reasons, the concentration of available food in an area will decline once foragers begin to feed. In any mixed-species aggregation of foragers, the species least efficient at feeding will give up first as prey become more difficult to get. More efficient foragers will continue to feed until insufficient capture rates force all species to give up. If a measure of the quality of the food patch is available, this information is also useful. Only efficient foragers should be found on lower quality patches whereas all foragers can profitably feed in the richest patches. Measures of patch quality would include, for example, acoustic measurements of fish schools indicating biomass, density, and size distribution. In this manner, the composition of a foraging aggregation can be used to assess relative feeding efficiencies of competing species.

Data on foraging, the act of gathering food, provide the most direct tests possible of hypotheses concerning the limitation of populations by their ability to gather food. Observational studies of foraging aggregations in important bird and mammal foraging areas, coupled with acoustic measurements of fish, offer opportunities to quantify the foraging efficiencies of the animals attracted by such prey. This proposed study will collect foraging data on predators feeding in mixed-species aggregations, and will examine foraging efficiencies, population indices, and food web relationships in the context of the community dynamics of fish-eating birds and mammals.

NEED FOR THE PROJECT

A number of species injured by the *Exxon Valdez* oil spill and currently showing little or no sign of recovery have in common a habit of foraging in the pelagic environment on small, schooling fish. These include harbor seals, common murres, marbled murrelets, and pigeon guillemots. A 1991 workshop on population declines in these north Pacific marine birds and mammals listed studies of foraging behavior among the most useful for testing the hypothesis that food availability limits population growth and recovery for these species. Workshop participants also concluded that studies focusing on community dynamics of fish-eating predators were an important ingredient to understanding seabird declines. Investigation the food-limitation hypothesis has been identified as a research priority for these species by the *Exxon Valdez* Restoration Office.

As food becomes scarce in any environment, less efficient foragers should experience food shortages earlier and more severely than more efficient foragers. Preliminary observations from foraging aggregations on overwintering schools of 1-2 year-old herring suggest that animals are structured in this manner even within a single foraging aggregation. The food availability hypothesis predicts that population declines will be correlated with food shortages, and hence with feeding efficiency. This study of foraging efficiency thereby provides a simple approach to addressing the general hypothesis that a shortage of food is responsible for the lack of recovery of injured species.

In addition to providing a simple test of the food-limitation hypothesis, results of this study may be useful in developing: 1) indices of population size, distribution or foraging behavior for fish-eating birds and mammals; 2) estimates of mortality to some small schooling fish species (e.g., salmon fry and juveniles, herring) from bird and mammal predation; and 3) a better understanding of shifts in food web structure among seabirds, their prey, and their predators.

PROJECT DESIGN

A. Objectives

This study will estimate relative foraging efficiencies of foragers in mixed-species aggregations of birds and mammals feeding on small, schooling fish (i.e., forage fish). Results will be used as a test of the food-limitation hypothesis for declines or lack of recovery among sea birds and mammals. Specifically, I will test the prediction that, for foragers on small, schooling fish, relative foraging efficiencies measured at temporary foraging aggregations are correlated with the severity of population decline.

Sampling will be conducted during the field seasons of the SEA and the Pelagic Predator research programs, when foraging aggregations form within the focal study areas of those two programs. Objectives for this sampling are:

1. Record size and composition of foraging aggregations feeding on small, schooling fish. For aggregations persisting less than several hours, record arrival and departure sequence of foragers.

2. Sample behavior at foraging aggregations to measure dive and capture rate for foragers that bring prey to the surface before consuming them (e.g. gulls and terns). This provides a test of the assumption that foraging efficiencies for these species are indicated by the composition of, and departure time from, foraging aggregations.

3. Use data from this proposal and from acoustic surveys to conduct a test of the food-limitation hypothesis, base on foraging efficiencies.

B. Methods

1. Size and composition of foraging aggregations: Foraging aggregations will be observed from a small boat, from shore, or where necessary and if space is available, from acoustic survey boats. All foragers present (including potential predators on foraging birds) will be counted and identified to species if possible, or to species group, and foraging behaviors noted. Aggregations will also be photographed for later counting to check on-site estimates. Repeated counts through out the observation period will be used to record arrival and departure sequence. Pelagic Predator focal study areas are designed to contain important PWS foraging areas for these species, and I will request information on locations of foraging 'hot spots' from both SEA and Pelagic predator research boats.

2. Behavior: Focal-animal sampling will be conducted on-site if possible, and from video tapes otherwise to estimate dive rates for each prominent species (or species-group) of forager and to estimate capture rates for each species that brings food to the surface before consumption (e.g., gulls and terns). Response to and interactions with potential predators (e.g., eagles) will be recorded to estimate impact of predation risk on foraging.

3. Analysis: Estimates of foraging efficiencies will be made from the composition of aggregations, the arrival and departure sequence of species and the dive success rate (only for species consuming prey on the surface). The food-limitation hypotheses will be examined and evaluated in light of this data.

C. Schedule

Jan- Mar	Organize logistics, purchase equipment and hire personnel
Apr-Aug/Sep	Field work in coordination with SEA and Pelagic Predator studies
Sep-Dec	Begin analysis and report writing

D. Technical Support

This project benefits from the availability of acoustic and net sampling data from SEA and Pelagic Predator research, but is not dependant on those projects to achieve its objectives.

E. Location

Field research will be conducted primarily in Prince William Sound, and analysis will occur at the PWS Science Center.

PROJECT IMPLEMENTATION

This research is proposed by and should be conducted by the Prince William Sound Science Center. The theoretical basis for this work developed from Science Center staff's (D. Scheel, PI and T. Vincent) past work and interaction with colleagues (e.g., Vincent, Scheel, Brown & Vincent. In prep. Tradeoffs and coexistence in consumer-resource models: it all depends on what you eat.).

This work will utilize data from both the SEA program and Pelagic Predator project. Close interaction and access to SEA researchers and data make the Science Center an appropriate choice. It is also designed to complement other proposed research involving Science Center collaboration, including components of the SEA Herring program, SEA Predator-prey program, and the Science Center proposal to conduct a forage fish assessment.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is designed with input from the SEA program, and the Pelagic Predators and Nearshore work groups and compliments research proposed within those groups. The PI of the proposed work has been and will continue to be an active participant in SEA and EVOS Trustee meetings to integrate research.

PUBLIC PROCESS

This project was developed following consultation with SEA, Pelagic Predator and Nearshore work groups, and participation in EVOS workshops focused on research priorities. The public has been involved in this project through their participation in those activities. This research is integrated with two projects under the SEA program (Predation on hatchery fry, Herring overwintering), each of which will be involving interested public volunteers to collect some data. Data from these two projects may contribute to tests of hypotheses described here.

BUDGET ($K)

	FY95	FY96
Personnel	94.8	94.8
Travel	10.6	10.6
Contractual	8.4	8.4
Commodities	8.9	8.9
Equipment	29.9	0
Total direct costs	152.6	122.7
Indirect costs (20%)	30.5	24.5
Project Total	183.1	147.2

Settlement Rates of Nearshore Invertebrates, Oceanographic Processes and Population Recovery: Are They Linked?

Project Number:	95025D
Restoration Category:	Research
Proposed By:	DOI
Cost FY 95:	$435,700
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Prince William Sound (initially)
Injured Resource/Service:	Multiple resources

INTRODUCTION

The *Exxon Valdez* oil spill directly and indirectly affected numerous organisms, including various species inhabiting nearshore environments. Some species in intertidal and subtidal habitats have not recovered fully since the spill, so the question remains: What is limiting the recovery of affected organisms?

This proposal addresses the hypothesis that physical factors (climatic, oceanographic) may be limiting the recovery of some intertidal and subtidal organisms by limiting settlement and possibly recruitment into these populations. This has been judged a high priority research issue for intertidal and subtidal organisms. With a focus on the connection of the pelagic to the benthic or epibenthic, this proposal attempts to build a bridge between the SEA study and nearshore studies. Additionally, it may provide information to address the question of whether processes limiting invertebrate prey ultimately limit vertebrate predators affected by the spill. Investigations into settlement limitation may also indicate which organisms and processes would serve well as long-term, cost-effective monitoring indicators of broad-scale processes.

The central questions of this proposal are:

1. Are populations of some nearshore organisms (e.g., mussels, barnacles, clams) limited by settlement of larval forms from the plankton, and has oiling of sites affected settlement rates or recruitment?

2. Do offshore (pelagic) physical forcing functions control settlement of planktonic larvae into nearshore environments, affecting the ability of the adult populations to recover from the *Exxon Valdez* oil spill?

3. Can the distribution and abundance (or settlement rate) of larvae of select species be used as indicators of mesoscale circulation of marine waters, linking transport phenomena with a characterization of which habitats may be more resilient to disturbance (i.e. they recover from disturbance more easily)?

Future work outside of Prince William Sound would address additional questions. For example, do differences in circulation and larval biology account for some of the differences observed in the Coastal Habitat intertidal studies between and among regions (e.g., results for Prince William Sound and Kodiak/Alaska Peninsula sites being more similar than Cook Inlet/Kenai Peninsula sites for some species)?

Results from studies conducted since the *Exxon Valdez* oil spill have indicated that plants and animals living in the upper portion of the intertidal zone have suffered more extensive injury than those lower in the intertidal and have shown less recovery. Among those affected species are barnacles, limpets, littorines, and *Fucus*. Additionally, mussel beds in some sites were heavily oiled, and due to the sequestration of oil in sediments among the byssal threads, oil has remained and has shown retarded weathering.

This project will evaluate the best candidate species for investigation, based on their response to oiling and cleanup activities following the *Exxon Valdez* oil spill, their relative abundance and importance in nearshore communities, and their possession of a planktonically dispersed larval stage. This proposal focuses on settlement and recruitment of barnacles and mussels. Mussels are also taken in subsistence harvests, so injured services are indirectly being addressed.

NEED FOR THE PROJECT

This research is designed to examine whether offshore (pelagic) physical forcing functions control settlement of planktonic larvae into nearshore environments, affecting the ability of the adult populations to recover from the *Exxon Valdez* oil spill. Intensive site-specific manipulations, such as those being performed at Herring Bay, provide data on locally operating mechanisms, but this proposed study is designed to address variability in the contributions from the plankton on a broader scale, and thus may allow broader interpretation of differences observed within Prince William Sound and between Prince William Sound sites and those in the Cook Inlet-Kenai Peninsula region and Kodiak-Alaska Peninsula region.

Ecosystem processes are being viewed as the primary factors influencing the recovery of nearshore communities. This proposal addresses two of the four most important research questions relating to community structure impacts that were identified in the "Invitation to

Submit Restoration Projects" booklet (May 1994). These ask whether recruitment limitation or physical processes limit recovery of the nearshore communities.

Results of this study will indicate whether recruitment limitation and physical factors are linked and how they are affecting two important intertidal groups. Recovery may be attained when indications from this study and monitoring of oiled and non-oiled (control) sites (another study) and Herring Bay studies suggest that larval settlement is not limiting and populations of affected organisms are not different between treatments. A combination of results from this study and Herring Bay work may allow determination of intrinsic differences between oiled and control sites.

PROJECT DESIGN

A. Objectives

1. Evaluate other candidate species (than mussels and barnacles) for settlement/ recruitment studies based on synthesized information from existent studies, needs of other investigators, and degree of knowledge and appropriateness of larval life history (e.g. littorines, limpets).

2. Identify specific sampling sites in Prince William Sound based on site visits and criteria listed below (Methods).

3. Evaluate multiple methodologies for investigating settlement rates of barnacles, mussels, and other chosen species (settling plates, cleared rock substrates, passive plankton collection tubes [Yund, Gaines, and Bertness, 1991], collections of filamentous algae and plastic toughies for mussels, etc.).

4. Measure within and between site variation in settlement rates of chosen species.

5. Use PWSAC plankton watch collections (March-June) to describe the timing, duration, magnitude and species composition of larvae in the springtime zooplankton stocks. Extend plankton collections to more distant sites and for a longer season (through August).

6. Collect nearshore physical oceanographic data and integrate nearshore conditions with more offshore oceanographic conditions. Provide information for development of a nearshore oceanographic smear model.

7. Compare and integrate physical oceanographic measurements, larval distribution and abundance, and settlement rates within and across sites.

8. Work cooperatively with SEA investigators, Herring Bay investigators, and other nearshore investigators to maximize information gain, make logistics more efficient, and facilitate information exchange.

B. Methods

Specific sampling sites in Prince William Sound will be identified based on physical parameters (and the ability to tie into offshore oceanographic sampling), community composition, oiling history, proximity to PWSAC plankton watch collection locations, ability to tie into existent studies (notably CHIA and Herring Bay), and coordinated needs of other nearshore investigators.

Examination of settling rates will be conducted from April through August, with greater effort projected during the April through June period, when there are peaks of barnacles settling. Multiple methodologies will be evaluated and some tested as to their efficacy. These will include: clearing of rock substrates, settling plates, possibly a passive plankton collection tube, and specifically for mussels, seasonal scrapes of filamentous algae and artificial substrates (plastic toughies, astroturf).

Determination of recruitment limitation of populations will be based on comparison of settlement rates, relative success of settlers through time (= recruitment) and the impact of recruitment on population structure versus competition and predation. Effects of predation on recruits will be examined by comparing caged and uncaged settling plates. Permanent transects and quadrats will be established to look at community change through time. Results of the other studies will be compared to changes in focus species through time.

Nearshore physical oceanographic measures will be decided upon, in consultation with Dr. Dave Salmon, and will be conducted in conjunction with the PWSAC plankton tows.

Larval availability will be determined through interpretation of the twice weekly PWSAC plankton tows. If a passive plankton collection tube is feasible, then it may provide another measure of cumulative larval plankton abundance over the season; tubes could be set in place and more sites could be examined over the same time period.

C. Schedule

October 1994	Coordination meeting/workshop for nearshore investigators. Synthesize questions, information, decide on sites to maximize overlap and focus, coordinate for logistics, include representatives from nearby communities or subsistence investigators.
November 1994	Preparation of detailed study plan. Initiation of necessary contracts (e.g., vessel charter).
April-Aug 1995	Field work.

Sept, Oct, Nov	Data analysis.
Dec 1995	Report writing.
Feb 28, 1996	Draft annual report.
June 1996	Revised Annual Report.

D. Technical Support

Technical support needed to complete this project includes the taking and analysis of the PWSAC plankton tows. Currently this is being coordinated and analysis supported by the SEA plan. The broader success of this project will be enhanced by linking the nearshore biological and physical processes with those offshore in Prince William Sound. Effort (and money) should be dedicated to achieving that integration. Additional monies should be put towards developing a nearshore smear model. Basic computer support will be provided by the National Biological Survey. Data management needs to be broadly integrated and coordinated for EVOS Restoration Projects. Geographic Information System (GIS) services will be needed from the Alaska Department of Natural Resources to prepare publication quality maps of the sites (FY 96). Statistical or modelling support may be needed to integrate projects/data/models.

E. Location

Locations of sites will be determined in consultation with other nearshore investigators and SEA plankton and oceanographic investigators. Locations need to be in close proximity to the PWSAC plankton collections, and plankton work needs to be tied into community dynamic investigations at the Herring Bay site.

PROJECT IMPLEMENTATION

This project will be implemented by staff of the National Biological Survey (NBS), in coordination with other agencies and private organizations listed in Section F, below. It is appropriate for the NBS to implement this project, due its focus on ecosystem functioning and its designation of Prince William Sound as one of its focus ecosystems. Staff expertise to implement this project also resides within the NBS.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This effort will be integrated with other nearshore investigations to various extents. The most concerted integration will occur with projects looking at subtidal settlement, with the PWSAC collection programs and SEA plankton and oceanography studies, with other nearshore investigators - especially those focusing on whether prey are limiting vertebrate predators, and with Herring Bay studies. Because this study attempts to explain broad differences among sites, it will also be essential to coordinate with recovery monitoring of intertidal (and subtidal) sites

in Prince William Sound, and with future recovery monitoring of those sites outside of Prince William Sound. This project will also coordinate with subsistence studies. Cost reductions are expected to be achieved through coordination and integration. Some reduction in scope may be possible through integration with Herring Bay studies.

FY 95 BUDGET ($K)

Personnel	221.0
Travel	26.0
Contractual	103.0
Commodities	8.0
Equipment	31.0
Subtotal	389.0
Gen. Admin.	46.7
Total	435.7

Relation of Clam Population Structure to Recovery of Injured Nearshore Vertebrate Predators

Project Number:	95025G
Restoration Category:	Research
Proposed By:	DOI and University of Alaska Fairbanks
Lead Trustee Agency:	DOI
Cooperating Agency:	ADFG
Cost FY 95:	$208,500
Cost FY 96:	$241,300
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Central and western Prince William Sound
Injured Resources:	Clams, sea otters

INTRODUCTION

This project is one component of an integrated ecosystem-scale program entitled "Processes structuring recovery of injured nearshore vertebrate predators in Prince William Sound" (NVP). The NVP Program will assess predator-prey relationships in order to understand recovery patterns of significant vertebrate predators injured by the *Exxon Valdez* oil spill (EVOS) in Prince William Sound (PWS). As noted in the Program umbrella document, the NVP Program will utilize invertebrate prey populations as indicators of predator population density. Because of the important effects of sea otters on benthic ecosystems, abundance and size structure of significant prey should provide information on the recovery status of sea otter populations.

This project examines the status and dynamics of populations of clams, the primary prey for sea otters in PWS, in an effort to better assess the recovery status of sea otters, and to find explanations for an apparent failure of sea otters in some areas to recover from EVOS. Like sea otters, clams are a biological resource injured by EVOS. Patterns of recovery in clam populations are unknown. Two hypotheses will be evaluated:

1. Clam population status reflects the recovery status of sea otter populations in PWS. Clam abundance and availability in areas with damaged sea otter populations will be

greater than in areas with recovered sea otter populations.

2. Damage to clam populations has contributed to the failure of sea otter populations to recover from EVOS. Damaged sea otter populations are not recovering because damaged clam resources are not recovering.

Inadequate post-EVOS recruitment of clams may be constraining recovery of injured clam and sea otter populations. Dynamics of clam populations often are influenced substantially by patterns of recruitment. Intensity of recruitment in clams may vary significantly among years, and there may be some years in which recruitment does not occur. Such variations will have important consequences for species that depend on clams for food.

Although the NVP Program focuses on injured populations of vertebrate predators, our component project will, in addition, provide useful information regarding EVOS damage to subsistence use of clams. Prior to EVOS, clams were an important subsistence food at numerous locations in PWS. EVOS damage has limited subsistence use of intertidal clam resources.

This project will be effective in achieving stated goals if it is pursued over several years. However, limitation of work to FY 95 will provide information of significant value to the EVOS Restoration Program.

NEED FOR THE PROJECT

This component of the NVP Program will contribute to the ability of resource managers to understand if sea otters and clams are recovering from EVOS, and if not why not, and will allow resource managers and decision makers to use ecosystem-scale data to select appropriate restoration options for sea otters and clams in PWS.

Our project will address four important issues regarding the restoration of sea otter and clam populations in PWS:

1. Are clam populations different in areas where sea otter populations were reduced by EVOS, compared to areas in which sea otters were not reduced? This is a specific application of hypothesis H_{01} as defined in the NVP Program umbrella document. Does the pattern of difference indicate a causal relationship with injury to sea otter populations?

2. Are injured clam resources recovering? Clam populations are recognized as an injured resource, but recovery trends are unknown. Documentation of abundance, size structure, and recruitment patterns will provide useful information for determination of population dynamics for clams.

3. What factors are constraining injured resources from recovering? Clams are the most

important source of nutrition for sea otters in PWS. If current and recently past patterns of abundance, demography, and recruitment are contributing to low productivity in clam populations, sea otters may be suffering a consequent inability to recover effectively from EVOS damage.

4. How do patterns of clam abundance, size distribution, and recruitment influence subsistence clam resources in certain portions of the PWS region? An improved understanding of demographic and recruitment effects on clam availability will contribute to more judicious management of clam resources for human use during the recovery period.

PROJECT DESIGN

A. Objectives

The NVP Program will use an integrated, rigorously-managed ecosystem approach to understand why populations of nearshore vertebrate predators are not recovering from EVOS damage. Our component project will determine the current status of injured clam resources in PWS, and will assess the effects of clam abundance, size structure, and recruitment dynamics on the recovery of sea otter populations injured by EVOS. We will study both intertidal and nearshore subtidal clam populations known to be used as food by sea otters.

Our specific research objectives are:

1. Assemble, synthesize, and evaluate published literature on recruitment patterns of clam species that are common in nearshore habitats of PWS and are a significant part of the diet of PWS sea otters.

2. Determine the abundance and size structures of existing clam populations in nearshore habitats at selected study sites in PWS. Taxa to be evaluated will include, but are not limited to: *Saxidomus giganteus*, *Protothecа staminea*, *Tresus capax*, *Clinocardium nuttallii*, *Serripes groenlandicus*, *Mya arenaria*, *Mya truncata*, *Macoma spp.*, and *Hiatella arctica*. Some of the above taxa may be deleted because of individual site characteristics. Populations will be sampled in the intertidal zone and at two subtidal depths within the dive range of foraging sea otters. We will gather samples at three similar sites in NVP Program study areas distributed inside and outside of the EVOS area of PWS.

3. Determine rate and pattern of recruitment to settlement containers in study sites as indicated in objective 2 above. Settlement data will be collected quarterly, allowing assessment of variation in recruitment intensity by season and year.

4. Examine correlations of recruitment intensity of clams with habitat and oceanographic variables assessed in other EVOS-related projects.

B. Methods

Numbered sections below are keyed to task numbers shown previously:

1. This work will be done primarily by library database searches and consultation with present and past participants in EVOS Damage Assessment, General Restoration, Research and Monitoring, Habitat Protection, and related activities.

2. Samples will be gathered at three sites beginning in summer 1995 in study areas to be selected for the NVP Program. Tentative study areas are north Knight Island/Naked Island, South Knight Island, and Green Island/Montague Island. Tentative depths for subtidal samples are 6 and 12 m. Representative samples of sediment grain size distribution and organic content will be gathered at each location sampled for clams.

3. Settlement containers will be placed in each of the selected NVP study sites. Initial deployment will be done in summer 1995. During quarterly visits to study sites, containers will be retrieved for processing, and replaced with new containers. Thus, each container will have an exposure period of three months.

4. This task primarily will involve consultation with other EVOS Restoration participants working on oceanographic characteristics and planktonic ecology during the period of our study. We will attempt to collaborate with other investigators to determine associations and correlations among clam recruitment patterns and significant oceanographic and planktonic events.

C. Schedule

General milestones for this project:

Annual Progress Reports

Annual reports will be submitted each year in September.

Final Report

The final report for the project will be submitted in September 1999.

Task-specific milestones

Task 1: Compilation of information will be completed by 1 December 1995. Information will be incorporated in technical reports and publications that result from this project.

Task 2: Field samples will be gathered quarterly beginning in summer 1995 and concluding in summer 1998. Technical manuscripts will be completed and submitted by 31 March 1996 and 30 August 1999. Other manuscripts may be submitted depending on evaluation of data during the course of the project.

Task 3: Settlement containers will be deployed first in summer 1995. Quarterly

sampling will continue through summer 1998. A technical manuscript will be submitted for publication by 30 August 1999.

Task 4: Recruitment data will be integrated with other relevant data no later than 1 March of each year of the project, beginning in 1996 and concluding in 1999. A technical manuscript will be completed and submitted for publication by 30 September 1999.

Technical support for each task will be managed through the Institute of Marine Science (IMS), University of Alaska Fairbanks (UAF), and the Washington Cooperative Fish and Wildlife Research Unit (WACFWRU).

Field work for the project will be done at study sites in western and central Prince William Sound, Alaska, as specified above. Laboratory work, data analyses, and production of reports will be done primarily at IMS/UAF, Fairbanks, Alaska, and at WACFWRU, School of Fisheries, University of Washington, Seattle, Washington.

PROJECT IMPLEMENTATION

The NVP Program will be implemented through the National Biological Survey, Alaska Research Center, Anchorage, Alaska. The intertidal portion of this specific project will be implemented through the Alaska Department of Fish and Game. The subtidal portions of the project will be implemented through WACFWRU.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The NVP Program, of which our project is part, will establish and maintain a system for integrating component projects, and for integrating NVP projects with other components of the EVOS Restoration Program. NVP will include a Program Coordinator to oversee the compatibility and complementarity of component projects, ensure that milestones are met and deliverables produced, and serve as liaison with other components of the EVOS Restoration Program. In addition, NVP will include a Program Data Manager to oversee database management, facilitate the reasonable exchange of Program data among component projects and to other elements of the EVOS Restoration Program, arrange research travel and charters for NVP investigators, and support the administrative needs of the Program Coordinator. The Program Data Manager will maintain a central repository of all biological data collected by NVP Program participants.

NVP Program participants have established near-term milestones for the development of effective Program integration and management. The milestones are reviewed in the NVP umbrella proposal document.

FY 95 BUDGET ($K)

Personnel	48.6
Travel	15.0
Contractual	82.3
Commodities	21.5
Equipment	28.0
Subtotal	195.4
Gen. Admin.	13.1
Total	208.5

Primary Productivity as a Factor in the Recovery of Injured Resources in Prince William Sound

Project Number:	95025J
Restoration Category:	Research
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	DOI
Cost FY 95:	$315,400
Cost FY 96:	$310,000
Total Cost:	$935,400
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

This project will investigate the production and flow of fixed carbon in the nearshore ecosystem of Prince William Sound and will determine the importance of benthic primary productivity in the recovery of injured intertidal and subtidal species. Results from this project would lay the foundation for understanding how fixed carbon is moved through the Prince William Sound nearshore system, and how this carbon flow is altered by seasonal events. The study will determine the relative importance of carbon input from phytoplankton, benthis production, terrestrial plants, and episodic transport (e.g., herring spawn), Understanding the flow of carbon will increase our understanding of factors that limit recovery of nearshore organisms.

The results of the study will give information on the relative importance of the various sources of carbon that are introduced into the nearshore system. Importance is measured by the relative abundance of each source of carbon present in the higher trophic organisms. Information will also be generated on how these proportions change seasonally and how they are affected by physical and chemical processes.

From the above information it may be possible to estimate the relative importance of the various plant communities in supplying the nearshore invertebrate community with carbon. Further, a model could be created to predict the disturbance to a community if there are changes in the normal flow of carbon into the system. Such disturbances could be effected by

oil spill treatment, El Nino events, winter storms, etc.

NEED FOR THE PROJECT

Injury to the biological resources of Prince William Sound as a result of the *Exxon Valdez* (EVOS) oil spill have been documented since 1989. Although recovery has occurred for many species and is progressing for others, many injured resources have been listed as not recovering. The range of such injured and not recovering species includes bird, marine mammals, fish, and both intertidal and subtidal organisms.

One hypothesis for the lack of recovery for injured species is that recovery is limited by food/prey availability. Most of the injured species from the higher trophic levels (birds, fish, mammals) are predators on nearshore, marine organisms. These nearshore organisms make their living as predators themselves, as scavengers, as graziers, and/or as suspension/deposit feeders. The ultimate source of carbon/energy for all of these organisms is from primary production. In the nearshore there are four possible sources for carbon: the first three are primary production from terrestrial plants, benthic marine plants and phytoplankton, and the fourth is episodic transport of carbon. Benthic plants (seaweeds and marine grasses) provide carbon for graziers, such as littorines, urchins, and limpets. These organisms in turn serve as food for higher trophic level organisms. Populations of many of these grazers have been altered by the EVOS. Phytoplankton and organic detritus (along with zooplankton) provide carbon for suspension and deposit feeders, such as barnacles, mussels, and clams. The relative importance of these forms of carbon depend on the organisms and area of concern, but contributions from both phytoplankton and benthic plants may be important. Carbon production provided by terrestrial plants will be important in nearshore areas in the vicinity of streamsw and rivers. Episodic transport could bring in carbon from areas outside of the nearshore system. Two examples of this type of transport are the annual Pacific herring spawnings in the spring and the salmon runs in the summer and fall.

A decline in primary productivity in PWS as a direct or indirect effect of the oil spill could explain the lack of recovery of some injured resources. For example, sea otters may have less prey, which feed on seaweeds, available in an area where benthic production has been depressed as a result of the spill.

This project proposes to look at primary production as one aspect of an ecosystem approach to understanding recovery of the biological resources. The general approach is to determine the relative contributions of the various sources of production into the nearshore system and alsso to determine whether this pattern has been altered in areas affected by the oil spill and treatment.

PROJECT DESIGN

A. Objectives

1. To determine the productivity and standing biomass of benthic marine plants in the nearshore.

2. To determine the productivity and biomass of phytoplankton in the nearshore.

3. To determine the organic input to the nearshore from terrestrial sources.

4. To determine the relative contribution of these sources of carbon to the carbon budget of higher trophic level organisms.

5. To determine what factors may limit primary productivity in the nearshore.

B. Methods

Site selection. About four to six sheltered rocky sites in PWS will be selected based on intertidal and subtidal vegetation and associated communities. Areas of use by higher trophic level organisms such as sea otters, herring, and birds will be targeted, if possible. Site selection will be coordinated with the nearshore study groups of the National Biological Survey (NBS) and University of Alaska (UAF).

Primary productivity will be measured by C-14 fixation *in situ*. Productivity will be normalized both by chlorophyll content and by biomass. Determinations will be made during the period of algal blooms for phytoplankton and at quarterly intervals for benthic algae and eel grasses. Extrapolations will be made to determine the total productivity for the system on an annual basis. Water chemistry for the determination of nutrients will be performed on samples taken in and near to the selected sites. Light irradiance data will be collected as often as feasible for correlation with productivity rates.

Streams that flow into the nearshore area will be sampled for total organic carbon four times during the year. Stream flow rates and capacities will be estimated in order to estimate the total carbon input from this source.

Stable carbon isotope ratios can be used to determine the source of primary productivity used by various organisms. Nitrogen isotopes can be used to look at differences in trophic feeding. Isotope ratios will be determined for the sources of carbon including phytoplankton, benthic seaweeds, detritus, participate and dissolved organic matter and herring eggs. Additionally, stable isotope ratios (C and N) will be determined for several different organisms which use different feeding strategies. Such organisms will include a grazer, suspension feeder, detritus feeder and predator. Isotope ratios will be compared to those from the sources of carbon. The isotope ratio will be determined throughout the year in order to determine seasonal variation in feeding strategies and relative importance of carbon sources. This aspect of the study will be

closely coordinated with other trophic interaction studies proposed by NBS and UAF.

C. Schedule

Spring 1995	Site selection.
June 1995-June 1997	Sampling for photosynthesis, nutrients, light levels and isotopic rations. These will be done four times a year at quarterly intervals. One sampling date will coincide with the spring algal bloom in March.

Data compilation and analysis will be ongoing throughout the year. There should be a minimum of two years of sampling for estimation of year to year variation. Annual reports will be submitted by April of each year.

D. Technical Support

Laboratory analysis of stable isotope samples and CHN samples will be required.

E. Location

Field work will take place near and at selected sheltered rocky sites in Prince William Sound. Laboratory analyses will be done at the University of Alaska, both at Fairbanks and at the Juneau Center, School of Fisheries and Ocean Sciences.

PROJECT IMPLEMENTATION

This project should be implemented by the National Biological Survey as part of its nearshore ecosystem study. The study should be closely coordinated with others that propose to look at energy flows in the nearshore food webs.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is designed to be closely coordinated with nearshore food web studies of University of Alaska Fairbanks and the Prince William Sound Science Center, and with the nearshore trophic studies proposed by the National Biological Survey. Collaboration will occur with the SEA study through oceanography, herring projects, nearshore fish and avian predation. This study will provide information to other studies concerning how fixed carbon is routed to the nearshore organisms.

FY 95 BUDGET ($K)

Personnel	141.0
Travel	11.4
Contractual	77.2
Commodities	16.3
Equipment	6.5
Subtotal	252.4
Indirect Costs	63.0
Total	315.4

Five-year Plan to Remove Predators from Seabird Colonies

Project Number:	95042
Restoration Category:	General Restoration
Proposed By:	Pacific Seabird Group 4001 North Ninth St. #1801 Arlington, VA 22203 (202) 778-2240
Lead Trustee Agency:	DOI
Cost FY 95:	$75,000
Cost FY 96:	$0
Total Cost:	$75,000
Duration:	1 year
Geographic Area:	There is no field work for this project.
Injured Resource/Service:	Multiple resources, including marbled murrelet, common murre, pigeon guillemot, black oystercatcher

INTRODUCTION

This project will produce a practicable five-year plan whereby all introduced foxes, rats, ground squirrels and other alien mammals that have reduced nesting habitat at present and former seabird colonies in Alaska will be identified and recommendations will be made for their removal. We will produce a colony catalog on CD-ROM as well as hard copy of colonies where alien mammals should be removed. The five-year plan will identify cost-effective method(s) of removing alien mammals and establish a milestone and activity time line whereby removal from all islands can be accomplished within five years. The five-year plan will identify any needed regulatory activities (such as licensing or permitting the use of M-44's and 1080) and propose a strategy by which such approvals can be obtained.

During the past two years, the Pacific Seabird Group has asked the U.S. Fish & Wildlife Service either to fund this project itself, or to ask the EVOS Trustee Council to fund it. To the best of our knowledge, FWS has never asked the Trustee Council to fund this work, although the Trustee Council funded a pilot project to remove predators from two islands during FY94 (Project 94041).

The seabird species affected by this project include common murres, marbled murrelets, Kittlitz' murrelets, pigeon guillemots, tufted puffins, black oystercatchers, cormorants, black-legged kittiwakes and ancient murrelets. Some of these species suffered severe losses in the spill, but little work has been done to restore their populations. While most of the islands are outside of the Trustee Council's definition of spill area, all of the bird species killed in the spill are migratory. Common murres throughout their range in the Gulf of Alaska and the Aleutian Islands are probably genetically linked. Banding studies of alcids indicate that substantial numbers of young birds prospect for breeding sites long distances from their natal colony, such as the distance from the Aleutians to Prince William Sound. Colonies outside the Trustee Council's definition of the oil spill area are a source of birds that can and will recolonize damaged colonies. NOAA's proposed natural resource damage assessment rules (January 1994) allow for restoration of resources beyond the oil spill area when such resources have been damaged.

NEED FOR THE PROJECT

The five-year plan will provide state and federal trustees with a realistic approach to restoring Alaska's seabird colonies. Because biologists have eliminated predators from some breeding islands, we can estimate the increase in the population of seabirds that has occurred once predators such as rats and foxes have been removed. After Kaligagan Island was stocked with foxes in 1921, its seabird population plunged so low that the renowned Alaska naturalist Olaus Murie recommended that it continue as a fox farm. In the 1980s, after foxes had died out, Kaligagan had 125,000 burrowing seabirds. FWS biologists have described dramatic increases in bird populations after foxes were removed from Nizki-Alaid Island in the western Aleutians. They found particularly impressive increases for loons, pelagic cormorant, Aleutian green-winged teal, common eider, glaucous-winged gull and tufted puffin. At a 600 hectare island off Newfoundland, twelve foxes consumed 31,000 Leach's storm-petrels in one breeding season. Alien predators obviously can devastate seabird colonies.

Arctic fox, red fox (introduced for commercial ranching) or rats occur on dozens of islands in the Alaska Maritime National Wildlife Refuge. We cannot estimate with any precision the increase in population if the island ecosystems in the Alaska Maritime National Wildlife Refuge were restored to their natural, predator-free condition. We believe that increases per island would range from 10,000 to 150,000 birds. It is possible that a few decades following predator removal a colony of one million or more birds might be reestablished. Accordingly, alien predators on the Alaska Maritime National Wildlife Refuge depress seabird populations in the order of one to ten *Exxon Valdez* oil spills.

The Trustee Council should plan for compensatory restoration in breeding areas outside of the spill area. This project will provide a framework for large-scale, cost-effective compensatory restoration.

PROJECT DESIGN

A. Objectives

1. Identify all present and former seabird colonies that are limited by alien mammals.

2. Propose a method to remove each alien population of mammals from the colony in conjunction with the Alaska Maritime National Wildlife Refuge.

3. Develop a five-year plan whereby all such populations could be removed.

B. Methods

1. Literature search and consultations with federal, state and other natural resource managers to identify all islands with introduced predators.

2. Consult with FWS, ADFG, USDA Animal Damage Control, and predator removal experts abroad to identify the most efficacious removal techniques.

C. Schedule

Activity	Month
Contract Award	0
Work Begins	1
Literature search completed	3
Agency/experts contacts completed	5
Draft Report for comment	8
Final Report	11

The draft report can be available for public comment if the Trustee Council believes that this would be necessary.

D. Technical Support

PSG will need access to the FWS colony catalog data base.

E. Location

Juneau, Anchorage, Homer, Aleutian Islands

PROJECT IMPLEMENTATION

For over two years, PSG has urged FWS to undertake this project. PSG is prepared to facilitate this project by functioning as the lead organization.

PSG is an international organization that was founded in 1972 to promote knowledge, study and conservation of Pacific seabirds. PSG draws its members from the entire Pacific Basin, and includes biologists who have research interests in Pacific seabirds, state and federal officials who manage seabird refuges and individuals with interests in marine conservation. PSG has hosted symposia on the biology and management of virtually every seabird species affected by the *Exxon Valdez* oil spill, and has sponsored symposia on the effects of the spill on seabirds. As such, PSG is uniquely qualified to implement this project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project can be integrated with project No. 94041 that removes predators from two colonies. Moreover, if the Trustee Council were to fund predator removal from additional colonies during FY95 (as PSG would urge it to do), this project would be integrated with any such project(s).

FY 95 BUDGET ($K)

Sub-contract(s)	50.0
Travel	8.0
Commodities (supplies, telephone, etc)	2.0
General administration/overhead	15.0
Total	75.0

Cordova Cutthroat Trout Habitat Rehabilitation

Project Number:	95043A
Restoration Category:	General Restoration
Proposed By:	USFS
Cost FY 95:	$26,400
Cost FY 96:	$0
Total Cost:	$26,400
Duration:	1 year
Geographic Area:	Streams in Eyak Lake basin and in logged areas near Cordova
Injured Resource/Service:	Cutthroat trout

INTRODUCTION

In recent years there has been increasing concern over the cutthroat trout populations in the Prince William Sound area. Studies by the Alaska Department of Fish and Game show that cutthroat trout were adversely affected by the *Exxon Valdez* oil spill. Areas in Prince William Sound have been closed to cutthroat fishing, and reduced limits and size restrictions have been imposed in the remaining areas. In addition, road construction and other development around Eyak Lake, near Cordova, has eliminated cutthroat spawning habitat. Recent timber harvesting east of Cordova could possibly have adverse effects on cutthroat habitat, although no assessment has yet been made.

The Cordova Ranger District proposes to work with the City of Cordova, the State of Alaska, and the Eyak Corporation, to identify degraded cutthroat habitat and develop a restoration or enhancement program. Although the areas identified so far are not on Forest Service land, adjacent Forest Service lands or recreation sites could be affected. In addition, if cutthroat populations in Eyak Lake and other areas are restored, there would be less fishing pressure on some of the small cutthroat stocks in streams on Forest Service lands.

The initial role of the Forest Service would be to take the lead in contacting the other groups and developing a memorandum of understanding. If the groups agree to undertake a cutthroat habitat restoration program, the Forest Service could help identify the work that needs to be done, develop proposals, obtain permits, and work on the environmental analysis.

Once the work is identified, additional funding will be needed to carry out the projects, most likely in FY 1996. The landowners should be responsible for hiring the crews to work on their lands. This will help ensure that members of the local community are hired. The role of the Forest Service at this point would be to provide some technical assistance, if needed, and to evaluate the work that has been done.

NEED FOR THE PROJECT

Historically Eyak Lake supported a good cutthroat sport fishery with estimated harvests ranging from 90 to 833 during the period from 1977 to 1989. The loss of spawning habitat from the construction of roads, a water treatment plant, and housing seems to have adversely affected the population, however. Although there is only anecdotal information and limited data from a study in 1991 by ADFG, it appears that the population has declined dramatically.

In the areas east of Cordova where timber harvesting has occurred, there is little or no information as to whether cutthroat habitat has been affected. These areas do surround several lakes which have cutthroat and include the streams where cutthroat spawning would take place.

In both cases there is a need to determine what damage has been done, what potential problems exist, and how to remedy the situation. In some of the logged areas, for example, all that may be needed could be the rehabilitation of the roads to halt sedimentation of the streams. Around Eyak Lake it may be necessary to construct additional spawning area or reset culverts so they do not block cutthroat migration. Most of all, it is important to identify the problems that exist so measures can be taken before the cutthroat populations are further impacted.

Speaking in more general terms, there are a number of other reasons for preserving or enhancing the cutthroat populations in the Cordova area. Although the Cordova area was not in the direct path of the oil spill, the study by ADFG found that cutthroat trout can stray considerable distances. Thus, it is possible that Cordova stocks have been affected. This study also suggests that the effects of the oil spill may have spread into unoiled areas in 1990, affecting the growth of Dolly Varden char. While no adverse affects were noted for cutthroat in unoiled areas, there could still be residual effects that have gone undetected.

There are also some genetic concerns that need to be addressed. Since Prince William Sound is the northern limit of the cutthroat trout's range, there may be unique genetic stocks which have adapted to the extreme conditions here. The local populations should be protected until genetic studies have been conducted.

Cutthroat trout also provide a popular sport fishery in the spring and early summer before the salmon runs begin, especially for fly fishermen. As tourism increases, and especially if the Copper River Highway is completed, fishing pressure will increase in the Cordova area. It will

be important to maintain or enhance the fish populations to preserve the recreational experience and the economic benefits derived from sport fishing, as well as the biological vitality of the stocks.

PROJECT DESIGN

A. Objectives

The main objective for FY 1995 would be to identify habitat restoration opportunities in the Cordova area. This would require coordination and cooperation among the City of Cordova, the Eyak Corporation, the State of Alaska, and the U.S. Forest Service since these entities are the principal landowners in the area. Once the opportunities are identified, the groups would need to develop a memorandum of understanding to determine the responsibilities each group will have for implementing the restoration work. The actual project work would be funded separately for FY 1996.

B. Methods

The Cordova Ranger District would take the lead in arranging and facilitating meetings with these groups and other interested parties. If there is sufficient interest and agreement, the preliminary surveys and assessments would then be carried out, preferably with representatives from all of the groups. However, the Alaska Department of Fish and Game and the U.S. Forest Service would be expected to provide technical expertise as to how to conduct the surveys and the rehabilitation work. A project work plan would then be submitted to the parties for approval.

The surveys and assessments would require a three-person crew for two months. Each of the streams in developed or altered areas would need to be surveyed. Special attention would be given to road crossings and other areas where erosion or migration barriers would be likely to occur. As the crews walk the streams, the amount of spawning and rearing area would need to be recorded, problem areas would be identified, and restoration prescriptions or enhancement opportunities would be noted.

C. Schedule

October 1994 - February 1995	Develop memorandum and commitment of personnel for preliminary surveys.
May - June 1995	Conduct surveys to assess project needs. Prepare project work plan.
July 1995	Decision on project plan.

D. Technical Support

Technical expertise on the rehabilitation of logging roads, tree planting and other silvicultural practices, and hydrology may be needed to carry out the surveys and assessments. There are qualified Forest Service personnel that could perform some of this work, but other parties may also have qualified personnel. Selection of the assessment team will need to be developed during the meetings.

E. Location

The proposed project area would include the Eyak Lake watershed near Cordova (Cordova C-5 quadrangle, T15S, R1W and R2W) and the logged areas approximately 13 miles east of Cordova (Cordova C-4 quadrangle, T15S, R1W) around Lake Elsner and several other small lakes.

PROJECT IMPLEMENTATION

The Cordova Ranger District could arrange the meetings and discussions, but after that the duties would be shared by all of the aforementioned parties. The main part of the habitat survey work and the identification of restoration and enhancement opportunities could be carried out by the Forest Service, since the agency has experience in this area. However, it would be best if all of the parties involved could provide as much input as possible. The actual implementation of the restoration work would be carried out by contractors, employees of the Eyak Corporation, or other personnel.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Not applicable.

FY 95 BUDGET ($K)

Personnel	21.6
Travel	0.8
Contractual	0.0
Commodities	0.0
Equipment	0.8
Subtotal	23.2
Gen. Admin.	3.2
Total	26.4

Cutthroat Trout and Dolly Varden Rehabilitation in Western Prince William Sound

Project Number:	95043B
Restoration Category:	General Restoration
Proposed By:	USFS
Cost FY 95:	$132,200
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Cutthroat trout and Dolly Varden

INTRODUCTION

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

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

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

Prince William Sound (PWS) is the northern extent of the range of cutthroat trout. The cutthroat stocks known to exist within PWS are few in number, rarely number more than 1,000 individuals, and are geographically isolated from each other. Of 143 streams surveyed for spawning salmon in PWS in 1989, only 10 contained anadromous cutthroat trout. These fish have a limited home range and do not migrate over great expanses of water. These small

populations are vulnerable to exploitation and habitat alterations. Dolly Varden and cutthroat trout in oiled areas may have sustained a sublethal injury (slower growth in oiled areas). Scientists cannot estimate a recovery time without further study.

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

PROJECT DESCRIPTION

A. Objectives

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

B. Methods

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

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

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

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

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

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

Bank Cribs with Cover Logs
These structures protect unstable banks, while at the same time providing excellent overhead cover for fish.

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

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

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

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

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

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

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

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

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

Alternative Methods
In addition to the present proposal, alternatives considered to mitigate effects on cutthroat trout and Dolly Varden included: decreasing fishing mortality, transplanting cutthroat trout and Dolly Varden char from healthy populations, starting new cutthroat trout and Dolly Varden populations, and redirecting sport fisheries by planting other species in barriered lakes. These alternatives were dropped from further consideration for reasons described below.

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

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

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

Redirect sport fisheries by planting other species in barriered lakes
Harvest mortality on cutthroat and Dolly Varden trout could be decreased by substituting other

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

C. Schedule

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

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

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

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

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

Activity	Time Period
Habitat surveys	05/94 - 11 /94 (02/94 - 07/94)
Stream monitoring	05/94 - 05/95 (02/94 - 06/94)

NEPA scoping & writing	01/94 - 12/94 (10/93 - 01/94)
Project construction	05/95 - 07/95 (05/94 - 07/94)
Estimate fish abundance & distribution	08/95 - 11 /96 (08/94 -11/94)
Analyze data, write project report	12/94 - 04/95, 12/95 - 04/96 (10/94 - 04/95)
Submit annual project report	04/95 ,04/96 (04/95)

D. Technical Support

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

E. Location

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

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

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

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

Billy's Hole, Long Bay (Northern PWS near Columbia Bay)
A short, wide and shallow channel connects a small lake to the larger 80 acre lake. Small structures to provide cover would be provided in this short connecting stream. Trout habitat can potentially be improved by constructing cover structures in a large semi-braided inlet channel

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

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

F. Environmental Compliance/Permit/Coordination Status

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

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

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

Project Location	Land Owner	NEPA
Otter Creek and Lake	USFS land, within Wilderness Study Area	EA

Cowpen Lake	USFS land, within Wilderness Study Area	EA
Gumboot Creek and Lakes	USFS land, within Wilderness Study Area	EA
Billy's Hole Lake	USFS land, within Wilderness Study Area	EA
Sockeye Creek and Lake	CAC land, within Wilderness Study Area	EA
Columbia Bay	USFS land, within Wilderness Study Area	EA

FY 95 BUDGET ($K)

Personnel	82.9
Travel	1.6
Contractual	4.4
Commodities	16.8
Equipment	13.8
Subtotal	119.5
General Administration	12.7
Project Total	132.2

Green Island Intertidal Restoration Monitoring.

Project Number:	95045
Restoration Category:	Monitoring (new)
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	USFS
Cost FY 95:	$113,414
Cost FY 96:	$112,955
Total Cost:	$343,033
Duration:	3 years
Geographic Area:	Prince William Sound

INTRODUCTION

We propose the first year of a three year effort to update and expand a project to monitor natural recovery of biological diversity and community structure in intertidal and shoreline ecosystems of outer Prince William Sound affected by the *Exxon Valdez* oil spill. In 1986 we began a project to document the biological diversity features of Green Island. In late March 1989 oil from the *Exxon Valdez* arrived at Green Island. In August 1989 we established intertidal and shoreline monitoring transects in 3 locations at Green and Little Green Island that had received heavy, moderate, and light oiling. The plots were remeasured in June 1990, and two publications resulted. Funding and support came from the University of Alaska and USDA Forest Service PNW Research Station. No money from the *Exxon Valdez* process was obtained to support the Green Island project. The study has been halted for lack of funding since. With this project we propose to continue our monitoring at Green Island and Little Green Island, and add a control (unoiled) site to be established at Hinchinbrook Island. This project will:

1. Update and analyze changes in abundance of intertidal organisms on the transects since 1989-90;

2. Determine overall changes in species richness since 1989/1986;

3. Document growth and community structure of *Fucus* that have recruited since 1989;

4. Compare community structure and species richness of the oiled sites with non-oiled sites to be established.

This project will provide a basis for determining the rate and degree of recovery from the spill in a representative heavily affected area, continue and update documentation of a site studied before the spill and now dedicated to long-term research and monitoring use, and generate reports, data bases, scientific literature, and public information.

NEED FOR THE PROJECT

Intertidal organisms are listed as one of the biological resources not recovering from the spill. Monitoring natural recovery has been identified as one of the primary restoration strategies for intertidal organisms, along with conducting research to find out why these resources are not recovering. While the lower and to some extent the middle intertidal zone are recovering, injury persists in the upper intertidal zone. In a previous paper on our Green Island study we proposed a conceptual scheme and explanation for why oil damage should be expected to be most severe at the upper intertidal level. We also suggested in that change to community structure was one of the major effects of the spill in our study area.

This proposed project will identify the pattern and rate of natural recovery on sites of different oiling severity and especially the *continuing* effects of the disruption cause by the spill - how community structure and composition has changed. A unique element of this proposed project is that we carried out taxonomic surveys in 1986 before the spill and thus we have some idea of how our site has been affected by the spill in particular. We also have voucher specimens, quantitative data, and photo documentation of intertidal sites matched to beach transects above with derived index values for the amount of oiling from 1989 and 1990. These are particularly valuable data sets given the importance of the time dimension in recovery processes. Any totally new studies begun now, no matter how well planned, would have to ignore or infer the previous condition of the community, making meaningful comparison difficult.

PROJECT DESIGN

A. Objectives

There are three main elements to successful data collection in a biotic monitoring project:

1. establishing high-resolution spatial control in order to be able to relocate individual small areas and organisms,

2. positively identifying species to ensure that changes seen between monitoring dates are properly assigned among species, and

3. quantifying the abundance of species.

To date, our Green Island project has concentrated on tasks 1 and 2; we propose to expand that

work at Green Island and establish an unoiled control site on Hinchinbrook Island. We have been impressed with the dynamic forces in the surf zone and have already experienced a significant loss of our permanent plot markers. Rehabilitation of markers is an important continuing task.

To accomplish our objectives we have identified four project tasks.

1. Update beach and intertidal transects. We propose to monitor our original transects in field season 1995, and thus be able to report results based on a comparison with 1989 and 1990 data. We will establish spatial control on the study locations and intensive study locations will be grided.

2. Expand the area of coverage and obtain and unoiled control site. A gap in our existing data base is the lack of an unoiled control site that matches the characteristics of our study area. We have identified a suitable area on Hinchinbrook Island and propose to establish a replicate monitoring installation early on in the project. We also are convinced of the need to expand the size of the plots we are monitoring to collect more data for the field effort and to overcome a large natural variability term.

3. Complete a biosystematic survey, species lists, and design a protocol to resample with the same intensity for the future. A master species list is a cumulative product, but we believe it is necessary to design a species diversity sampling protocol that can be repeated at intervals with some confidence of comparability.

4. Investigate winter and spring conditions. We have observed already the dramatic differences between summer and winter beach conditions. We believe that fall/winter site visits are necessary to observe and document some of the forces and immediate effects of winter storms.

Our three working hypotheses at this point are:

1. Mussels and other bivalves formerly restricted to crevice refuges on Green Island will successfully colonize exposed habitats, reducing the abundance of formerly dominant primary producers.

2. Simultaneous mass mortality disrupted the natural patch dynamic regime of disturbance in rocky intertidal habitats and is leading to a uniform, locally less diverse community structure in the area affected by the *Exxon Valdez* spill.

3. Opportunistic green filamentous algae will occupy growing space released by delayed mortality of the pre-spill organisms. To the degree that the green algae persist in local habitat patches in the 1993-1996 time period they are indicators of continuing, local chronic oil injury.

B. Methods

In 1989 at each site we established horizontal beach transects to map the extent and distribution of oil. Mapping extended from about MHHW (or 3 m above tidal datum) inland to the line of alder shrubs. Patches of oil along the beach larger than 30 cm along either axis were mapped in their entirety. The extent of oil coverage along the beach was mapped in percent cover classes. In the intertidal zone, we established 3 parallel transects oriented perpendicular to the shoreline. Along each transect line we established plots of 0.5 m x 0.5 m at vertical intervals of 1.0 m to determine the condition of marine organisms and communities. We photographed the intertidal plots and took notes and made collections of the plants and animals present, and noted the oiling condition. We made cover and abundance measurements from 8" x 10" black and white prints of the photos. Both the horizontal and vertical transects were permanently marked. During an extreme high tide stage we observed patches of oil or tar that were stranded on the lower beach to determine the potential for oil remobilization.

We will follow the methods of Jones et al. (1980) for monitoring rocky intertidal sites. We will obtain quantitative measures of cover/abundance through direct observation and sequential photography. We will expand the coverage of plots in our existing transects to an area that will allow characterization of the entire community and statistically valid estimation of the abundance of special species.

Special target species will be closely monitored within the transects and surrounding area because of their known important ecological roles elsewhere. A working list will be developed early in the project and adjusted as results dictate. Candidate species include the following:

The surfgrass *Phyllospadix serrulatus*, blue mussel *Mytilus edulis*, and brown rockweed *Fucus garderni*, three of the species that appear to have sustained the heaviest damage from the oil spill in our area.

The seastars *Pisaster ochracea* and *Evasterias troschelli*. The first is one of the most conspicuous animals along much of the Pacific coast intertidal zone where it has a major effect through predation on barnacles, snails, limpets, and chitons.

The snails *Nucella lamellosa* and *N. lima*, and the nudibranch *Onchidoris bilamellata*. The first species is a regulator of marine community structure.

The grazers *Strongylocentrotus droebachiensis* and *Katherina tunicata*. The second species is a significant herbivore in the region.

C. Schedule

Start project in February 1995 to prepare for 1995 field season. Visit site in spring low tide sequence to rehabilitate plot markers. Sample during summer low tide series and establish control site. Visit and assess site during fall/winter low tides. Recruit graduate student for fall 1995. Prepare first year report on 6-year (1989-95) changes. Coordinate with other restoration projects in

winter 1995-96 and modify plans. First year report in June 1996. Continue study in 1996 and 1997 seasons. Plan for permanent archiving of database and long-term future study at appropriate intervals.

D. Technical Support

University of Alaska Museum facilities (reference collection and archiving), computer mapping and access to previous Green Island study database, rock drill, taxonomic expertise in nearshore benthic organisms, statistical and ecological consulting.

E. Location

Green Island, Little Green Island, and north Montague Island

PROJECT IMPLEMENTATION

Because of the continuing nature of the project which would build upon a previous effort, the University of Alaska team that conducted the original study and which has the database and knows the study locations should implement the project. In addition Nora Foster is the taxonomic expert for aquatic and marine invertebrates in the state of Alaska.

COORDINATION OF INTEGRATED RESEARCH EFFORT

We propose to develop cooperation with the Institute of Marine Science at the University of Alaska Fairbanks including through support of a graduate thesis project. We plan to coordinate our study with others taking place at Green Island, especially studies of sea otter population changes. Taxonomic samples will be archived in the University of Alaska Museum for permanent referencing.

FY 95 BUDGET ($K)

Personnel	57.0
Travel	10.0
Contractual	0.0
Commodities	2.0
Equipment	12.0
Subtotal	81.0
Overhead (@ 47%)	32.4
Total	113.4

Investigation of the Long-term Record in Tree Rings of Climatic Features that Control Key Ecosystem Variables Related to Recovery in the Spill-affected Area

Project Number:	95046
Restoration Category:	Research
Proposed By:	Columbia University University of Alaska Fairbanks
Lead Trustee Agency:	NOAA
Cost FY 95:	$153,620
Cost FY 96:	$166,302
Total Cost:	Unknown
Duration:	1 year pilot study, probable 3 years overall
Geographic Area:	Prince William Sound, Kenai Peninsula, Kodiak Island
Injured Resource/Service:	Multiple resources

INTRODUCTION

We propose to sample tree-rings from a variety of sites in the spill-affected area to develop a long-term master chronology and proxy record of climatic conditions over the last 2 to 4 centuries. This project will calibrate tree growth compared to instrument-based climate records during the 20th century in order to determine the climatic sensitivity of the trees, and then extend the inferred climate record back in time as far as tree-ring records will permit. Climatic/oceanographic features can control populations of a variety of injured resources either directly or through their control of ecosystem variability. Studies of climatic/oceanographic variability have been identified as a high priority restoration research item. Long-term climate changes and/or cycles are potential explanations or additional factors that may be preventing the recovery of injured resources. Instrument-based climate records are limited in time in the spill-affected area, and the long-term perspective that tree-ring

Tree-rings, when properly sampled, measured, and interpreted, have proven to be useful and reliable indicators of climatic events. Different trees growing on different sites respond to a variety of factors in the environment. Trees on some sites slow their growth when summers are cold or accelerate growth when conditions are wet, for example. As a result, the long time series available from tree-ring records are an especially valuable source of information on long-

term environmental change. In addition, individual trees damaged by unrecorded natural disasters (volcanoes, heavy snow loads, droughts, abnormal short-term weather events, or insect attacks) produce thin tree-rings that can pinpoint these events. Whole stands of trees integrate and then record growing conditions over whole regions.

This project will provide a basis for determining whether natural climate cycles or trends are responsible for preventing the recovery from the spill, expand coverage of tree-ring work in a potentially climate-sensitive area, and generate reports, data bases, scientific literature, and public information.

NEED FOR THE PROJECT

Several of the injured resources that are not recovering are higher trophic level animals that are highly dependent of the fluctuating larger ecosystem of the spill-affected area. Climatic and oceanographic conditions can both augment and limit the productivity of this system, and the resulting ecosystem conditions may largely explain the status of injured resources. Studies and monitoring in the spill-affected area greatly benefit from a long time perspective, but few techniques are available to investigate the past. Tree-ring research is one of the best-established tools of investigating the past and this project can draw upon an emerging picture of the eastern Pacific climate system from other tree-ring studies in western North America. The forests of Prince William Sound are the northernmost expression of the coastal forest of western North America, and they are sustained in their extreme northern location to a great degree by advected heat from the North Pacific/Gulf of Alaska system. When that system changes in state it should be reflected in the growth of trees. The forests of Kodiak Island are the westernmost extent of the coastal forest and grow under a rigorous limitation by summer temperature, although a general treeline advance is continuing along the western margin of the coastal forest limits.

PROJECT DESIGN

A. Objectives

1. Develop a master chronology of climate response as reflected in tree-ring width and density correlated to the instrument-based record of the 20th century.

2. Identify the sensitivity of ring-widths and densities to key ecosystem-forcing properties of climate and ocean state in the spill-affected area.

3. Collect samples of ring-width series across the spill-affected area on sites that are sensitive to summer temperature, precipitation, and other factors.

4. Identify any unusual ring signatures that indicate volcanic events, extreme weather events, etc.

5. Develop a high-resolution proxy climate record for the 18th and 19th centuries, and if possible for the 16th and 17th centuries.

6. Integrate the proxy record into models of the larger spill area ecosystem.

B. Methods

Tree-ring analysis methods are fairly well established and involve cross-dating to assure precision of ring series, transformation of raw ring-width chronologies to unitless standardized ring width indices through user-specified function fitting, theoretically based and empirical application of spline and filter functions, and residual transformation.

1. Identify growth-sensitive sites in forests of the spill area and the particular factors of climate that tree-rings are responding to on such sites.

2. Correlate degree of sensitivity to master chronologies for all strongly correlated climatic/oceanographic parameters during instrumented period.

3. Extend record of proxy climate back by obtaining high-resolution tree-ring samples from Prince William Sound, Kenai Peninsula, and Kodiak Island. Attempt a 400-year chronology.

4. Provide input to ecosystem assessment team on pattern, trend, and periodicity of climatic/ocean state conditions. Formulate input into ecosystem model.

C. Schedule

Start project in February 1995 to prepare for 1995 field season by examining climate models and collecting instrument-based climate records. Visit low-elevation forest sampling sites in PWS in early summer 1995. Sample and revisit reference stands during July and August 1995. Visit high elevation treeline sites and take cores in PWS in July and August 1995. Prepare data and determine potential of different growth sensitive tree-ring sampling sites in fall 1995. Coordinate with other restoration projects in winter 1995-96 and modify plans. First year report in June 1996. Continue study in 1996 and 1997 seasons and expand to Kenai and Kodiak. Plan for permanent archiving of database.

D. Technical Support

See Project Implementation below.

E. Location

1995 - Prince William Sound (possible other coastal forest locations for background sampling).
1996 - Expanded PWS sampling on best sites, Kenai Peninsula.
1997 - Kodiak Is. and final sampling in other localities.

PROJECT IMPLEMENTATION

The conduct of this restoration project requires the combination of state-of-the art tree-ring analysis facilities, knowledge of the potential forest sampling base in the spill-affected area, and availability for involvement and interaction with ecosystem research teams in Alaska. A collaborative partnership recently established between the Tree-Ring Laboratory (TRL) at Lamont-Doherty Earth Observatory (LEDO) and the University of Alaska Fairbanks (UAF) Agricultural and Forestry Experiment Station (AFES) has the unique capabilities required.

TRL (at LEDO)has 3 computerized (Macintosh) measuring machines of its own design. The UAF AFES) recently acquired all the components for a similar measurement system and is being assisted by LDEO in making the system operational and compatible by the fall of 1994. These machines measure to an order of magnitude more precisely (.001) than commercially available units. For data analysis AFES has a newly acquired Macintosh Power PC 7100. AFES has one Zeiss binocularscope for ring boundary sighting; TRL has several microscopes, with one equipped for photomicrographs. TRL has fully operational x-ray and densiometric analysis systems, including a new high capacity image analysis system.

There are shop facilities for preparing specimens for ring-width or densiometric analysis at both LEDO and AFES. TRL has humidity-controlled storage rooms set up for preserving specimens. AFES is attempting to build an Alaska tree-ring archive for permanent archiving of Alaska specimens. TRL offices and labs occupy all of one building at LDEO. In addition, TRL has the use of support facilities at LDEO, machine and wood shops, libraries, etc. TRL has its own library of specialized computer programs for the reduction and analysis of tree-ring data. AFES has a data base on several large, precisely mapped forest reference stands in Prince William Sound and potential areas of similar vegetation with different climate in southeast Alaska that are permanently marked. These reference stands could serve as permanent sample/future monitoring sites.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Once the master chronologies and tree-ring sensitivities have been established, a close collaboration will be formed with ecosystem-level integrated programs such as the Sound Ecosystem Assessment (SEA). Input will be provided for ecosystem modeling efforts. Based on past patterns of climate-forcing as revealed in the tree-ring record, a projection of future

probabilities will be attempted that should serve as an indication of restoration outlook for dependent injured resources.

BUDGET ($K)

		FFY 1995	FFY 1996	FFY 1997
Personnel (include Indirect)				
	G. Jacoby	$38,212	$39,846	$42,850
	Other TRL	$30,042	$32,294	$34,535
	G. Juday	$19,747	$22,004	$23,697
	Other AFES	$18,619	$21,158	$22,004
	Grad student	$16,500	$17,500	$18,500
Travel (include Indirect)		$19,000	$23,000	$22,000
Contractual		$2,000	$3,000	$4,000
Commodities		$3,500	$4,500	$3,000
Equipment		$6,000	$3,000	$4,000
Capital outlay		$0	$0	$0
Gen. Admin.		$0	$0	$0
TOTAL		$153,620	$166,302	$174,586

RECEIVED
JUN 15 1994
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

Project # 95047

Anch, Ak 99503

6/15/94

My proposal for the actual restoration of the Prince William Sound would be to extacte the perimary eleiment within the Turnagain Arm an to seal the migrating contamination in place, seperating the contamination from the water colum.

Now I dont Cotton to the idea of the presumptuous an there schematice in Salmon habitat restoration of Prince William Sound, when they having a felonious postion of assessment to grants.

The above proposal being a cost plus project not unlike the pipe line it self, will also pay dividends!

Please see copyright filed TXu 545 416 and other documents plus attcements

signed Charles E. McKee

6/15/94

Independent Review of Salmon Restoration and Monitoring Projects

Project Number:	95049
Restoration Category:	Administration, Public Information and Science Management
Proposed By:	Natural Resources Consultants, Inc.
Lead Trustee Agency:	ADFG
Cost FY 95:	$31,874
Cost FY 96:	$0
Total Cost:	$31,874
Duration:	1 year
Geographic Area:	Kenai River, Kodiak Island, Coghill Lake
Injured Resource/Service:	Multiple resources

INTRODUCTION

The *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) has funded and will continue to fund numerous monitoring and restoration projects related to the *Exxon Valdez* Oil Spill. These projects have been conducted by personnel with excellent qualifications. However, good science is incomplete without thorough, independent review. Independent review of monitoring and restoration projects is needed to maximize the benefit of the projects and to minimize costs.

The purpose of this proposal is to offer the expertise of Natural Resources Consultants (NRC) and associates for the review and evaluation of salmon monitoring and restoration projects.

PROJECT DESIGN

The review and evaluation process would focus on the methodology and sampling design of the study in relation to the stated objectives, statistical procedures used in the analyses, interpretation of the results, and identification of assumptions used in the investigation. The evaluation will include recommendations for the reviewed investigation as well as

recommendations for future studies. All comments will be made with a thorough discussion of the issue. The goal of the review process will be to improve the investigation in order to better meet the goals of the EVOSTC. The schedule of the review process would be determined by the availability of draft reports.

PROJECT IMPLEMENTATION

NRC offers the expertise of three scientists who have extensive experience with salmon management, salmon ecology, habitat restoration, and limnological issues in Alaska. These scientists are Dr. Gregory T. Ruggerone, former project leader of FRI's Alaska Salmon Program, Dr. Donald E. Rogers, Research Professor at the University of Washington's Fisheries Research Institute (FRI), and Dr. F. Joan Hardy, who has conducted limnological and lake fertilization projects related to salmon enhancement in Alaska and British Columbia. These scientists are intimately familiar with monitoring and restoration projects of the type planned by the EVOSTC and could provide valuable insight to the studies

Projects that these scientist could evaluate include:

- Coghill Lake Sockeye Salmon Restoration
- Kenai River Sockeye Salmon Restoration
- Sockeye Salmon Overescapement
- Coded Wire Tag Recoveries from Pink Salmon in Prince William Sound
- Coded Wire Tagging of Wild Pinks for Stock Identification
- Forage Fish Study in Prince William Sound

COORDINATION OF INTEGRATED RESEARCH EFFORT

Drs. Ruggerone, Rogers, and Hardy frequently interact with agencies such as the Alaska Department of Fish and Game, who has conducted many of the monitoring and restoration projects. Drs. Ruggerone and Rogers have a long working relationship with ADFG and have also been asked by various clients to critically evaluate reports by the department. Our working relationship with ADF&G would facilitate the exchange of information needed to conduct reviews of their work.

PERSONNEL QUALIFICATIONS

Dr. Gregory T. Ruggerone has conducted salmon projects in Alaska during the past 15 years, including areas such as Upper Cook Inlet, Kodiak, Chignik, Bristol Bay, and coastal and offshore areas of the Gulf of Alaska. During the 1984-1993, he was Project Leader of the Alaska Salmon Program at the Fisheries Research Institute, University of Washington.

He designed, directed, and conducted salmon studies at the Chignik Research Station where his research goal was to determine factors influencing salmon survival, monitor salmon populations and their prey, develop techniques to improve harvest management, define escapement goals, and identify habitat restoration projects. Dr. Ruggerone has refereed numerous salmon studies for scientific journals, including *Canadian Journal of Fisheries and Aquatic Sciences, North American Journal of Fisheries Management, Transactions of the American Fisheries Society, Aquatic Living Resources, and Fishery Bulletin.* He has published over 10 investigations in peer-reviewed journals and over 40 technical reports involving salmon ecology, predator-prey interactions, salmon management, limnology, and habitat. Dr. Ruggerone is presently the Northwest District Director of the American Institute of Fisheries Research Biologists.

Dr. Donald E. Rogers, Research Professor at the Fisheries Research Institute, has conducted salmon studies in Alaska since 1958. During his 35 years of field research in Alaska, Dr. Rogers has investigated nearly all aspects of salmon life history and management. He developed an extensive monitoring program of sockeye salmon lakes in the Bristol Bay in an effort to determine factors influencing salmon survival and to develop salmon escapement goals. He conducted one of the first major lake fertilization projects in Alaska in an effort to enhance sockeye growth and survival. He has chaired the graduate committees of over 15 graduate students. Dr. Rogers is considered to be one of the most knowledgeable scientists on salmon management and biology issues in Alaska and is frequently requested by ADFG or other groups to provide expert opinions on salmon related issues.

Dr. F. Joan Hardy has over 15 years experience as a limnologist and aquatic toxicologist. During 1975 to 1980, she participated in one of the first large-scale lake fertilization studies in Alaska. Following her doctoral program at Fisheries Research Institute, University of Washington, Dr. Hardy received a two year NSERC fellowship with the Fisheries and Oceans Canada to conduct limnological studies involving the fertilization of sockeye salmon lakes. She was a Research Scientist with Canada's National Hydrology Research Institute and conducted additional limnological studies there. She assisted with the development of a limnological monitoring program for the Quinault Indian Tribe's sockeye lake and recently developed the aquatic plant management program for the State of Washington. She is presently investigating toxic cyanobacteria (bluegreen algae) in western Washington lakes.

FY 95 BUDGET ($K)

Personnel	31.9
Total	31.9

NOTE: This budget was generated for the review of the Coghill Lake Sockeye Salmon Restoration Project, the Kenai River Sockeye Salmon restoration project, and the Sockeye Salmon Overescapement project. Budgets for other projects would be provided as needed.

A Test of Sonar Accuracy in Estimating Escapement of Sockeye Salmon

Project Number:	95050
Restoration Category:	Research
Proposed By:	Natural Resources Consultants, Inc.
Lead Trustee Agency:	ADFG
Cost FY 95:	$79,290
Cost FY 96:	$78,030
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Wood River and Kenai River, Alaska
Injured Resource/Service:	Sockeye salmon

INTRODUCTION

Knowledge of salmon spawning density is paramount to conservation management of salmon runs in Alaska. Spawning density and the timing of the spawning escapement are primary factors that harvest managers can control during a fishery. Proper management of the spawning escapement is needed not only to perpetuate the salmon run but also to maximize the sustainable harvest of the run).

The *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) has identified Kenai River sockeye salmon as a biological resource that is not recovering from the 1989 *Exxon Valdez* oil spill. The primary reason for the declining run to Kenai River is the large escapement resulting from the closure of the drift gillnet fishery after oil contaminated the fishing grounds. The overescapement in 1989 was the third consecutive large escapement to the Kenai River. The first excessive escapement resulted from the *Glacier Bay* oil spill in 1987.

A primary issue surrounding the overescapement of salmon to the Kenai River is whether the sonar counters undercount sockeye salmon. The accuracy of the sonar counters was initially contested during the 1987 *Glacier Bay* oil spill trial and is an issue in the *Exxon Valdez* oil spill trial.

Natural Resources Consultants and its associate Dr. Donald E. Rogers, University of Washington, have provided evidence that adult salmon sonar counters underestimate salmon

escapement in Upper Cook Inlet based on information about their performance in Bristol Bay. In brief, sonar estimates of sockeye, pink, chinook, and chum salmon abundance in the Nushagak River, Bristol Bay, were less than expected based on comparisons with visual counts from towers and aerial surveys during an eight-year period. The sonar estimates of salmon abundance averaged 24% less than visual counts, but this error increased to 55% during years of large escapement. The greater undercounting error by sonar during large salmon escapements was predicted by John Suomola, an acoustic engineer at the Massachusetts Institute of Technology, because sonar may not discriminate between individual fish at high densities. Additional evidence that sonar is undercounting in Upper Cook Inlet is the fact that harvest rates for UCI sockeye salmon are high relative to other major sockeye salmon systems, even though sockeye runs to the Susitna River are frequently managed as "weak" and the Kenai and Kasilof rivers include glacial lakes that are generally less productive than relatively clear water lakes, such as Becharof and Chignik. Underestimation of sockeye escapement could explain the unexpectedly high harvest rates in the UCI management area. Finally, aerial counts of salmon, which are known to be biased low, are not that much lower than total sonar counts in the Kenai and Kasilof river systems. In 1988 and 1975, the peak spawning count for seven index streams (primarily aerial counts) in the Kasilof drainage actually exceeded the sonar count for the system even though the peak counts did not cover all spawning areas and no attempt was made to expand the index counts. The Alaska Department of Fish and Game discarded the sonar estimate in favor of the index count in 1988.

The issue of sonar undercounting reached a peak in December 1993 when the ADFG's sonar expert Paul Skvorc announced that sonar undercounted salmon abundance. Problems with sonar include high frequency which limits the ability of sonar to detect salmon, changing attenuation with conductivity of the water, and automation of the sonar counting procedure. The accuracy of sonar continues to be debated among ADFG personnel.

Although sonar has been used to count salmon in Alaska since at least 1978, no experiments have been designed to field test sonar using visual observations other than the Nushagak River analysis described above. The Kenai River appears to have received more salmon than counted by the sonar. The accuracy of sonar needs to be determined in order to help restore and monitor the declining sockeye runs to the Kenai River and to help manage the sockeye salmon runs in Upper Cook Inlet and other parts of Alaska. The proposed project will develop a correction factor that could be applied to historical sonar counts of adult salmon in the Kenai River and other rivers in Upper Cook Inlet. Thus, the proposed project will be beneficial both to conservation of injured resources and to fishermen injured by the reduced salmon harvests. The EVOSTC has identified the need to improve abundance estimation techniques and has funded genetic stock identification and coded wire tag studies. The proposed study would enhance the value of these funded studies.

The objectives of the proposed project are to:

1. test the accuracy of sonar on a seasonal and daily basis,

2. determine whether sonar counts are linearly or curvilinearly related to salmon

abundance,

3. compare automatic counts made by the Bendix sonar with acoustic marks made on a chart recorder,

4. develop a correction factor that could be applied to Bendix sonar counters in the Kenai River and other rivers in Alaska.

NEED FOR THE PROJECT

The declining sockeye runs to the Kenai River are believed to be related to overescapement in 1987, 1988, and 1989. ADFG estimates of escapement were based on sonar, which may be undercounting the escapement. Thus, escapement of sockeye salmon to the Kenai River, Kasilof River, Susitna River, and Crescent River in the Upper Cook Inlet Management Area may actually be much greater than previously estimated by the ADFG. Given the curvilinear relationship between actual escapement and sonar estimated escapement in the Nushagak River, the actual escapement to the Kenai River during 1987-1989 could be 70% more than the estimate made by sonar.

In order to evaluate the effect of overescapement on sockeye production in the Kenai River, it is imperative to determine the accuracy of the escapement enumeration procedure. Surprisingly, no studies have been designed to field test sonar estimates of migrating adult salmon. Evaluation of sonar by comparing visual and sonar counts over the course of the sockeye spawning migration is needed not only to evaluate overescapement in the Kenai River but also to evaluate sonar counts in all areas of Alaska where sonar is used as the primary enumeration process.

Results of the sonar test at Wood River could be used to correct sonar counting errors in the Kenai. Because Wood River is considered an ideal location for deployment of sonar, any error discovered at Wood River is likely to be equal to or less than that at glacial rivers such as the Kenai. Thus, correction factors at Wood River could be used to provide a minimum correction factor to historical sonar data in the Kenai River and other rivers in Upper Cook Inlet where sonar has been deployed. Results of this study would help resolve some of the questions related to the dispute over sonar accuracy.

PROJECT DESIGN

We propose to test the accuracy of Bendix sonar by comparing sonar with visual tower counts of sockeye salmon. The tower count method is considered to be one of the most accurate methods for enumerating salmon. Comparison of tower and sonar counts will determine whether sonar undercounts salmon and whether sonar undercounting is greater when large numbers of salmon are migrating, as indicated in the Nushagak River.

The investigation will occur in Wood River near Bristol Bay during 15 June to 20 July 1995. Wood River is a good location to test sonar because (1) the ADFG has a long history of enumerating sockeye salmon in Wood River from a tower, (2) the spawning escapement to Wood River (1 million fish) is similar to the Kenai River (750,000 fish), (3) Wood and Kenai rivers are similar in size, (4) large numbers of salmon may migrate upriver in a short time period, and (5) Wood River is an ideal location for sonar. Thus, the test will occur during ideal conditions, thereby allowing a test of sonar accuracy without complicating factors such as channel morphology.

The enumeration of sockeye salmon by sonar will be conducted without knowledge of daily or cumulative tower counts of sockeye salmon. Furthermore, visual observations of sockeye salmon in Wood River will not be used by the sonar crew to calibrate sonar. Wood River will be treated as if it were a glacial river similar to the Kenai River. The blind test approach is essential to objective testing of sonar accuracy.

A chart recorder will be used to record potential fish targets. These charts will be analyzed post-season to determine whether potential sonar counting error was caused by the automatic counting procedure of the Bendix equipment or by the sonar itself. Presently, sonar crews in Upper Cook Inlet rely on the automated counting procedure rather than interpretations of chart recordings. Additionally, conductivity of Wood River will be measured on a daily basis because conductivity may influence sonar accuracy. A video camera equipped with a polarizing filter will be used to document the methodology and to photograph the migration density of sockeye salmon during peak escapement periods.

Sonar methodology will be the same as that used on the Kenai River. Al Menin, who developed the Bendix sonar and who oversees ADFG sonar operations throughout Alaska, will assist with sonar set up, calibration, and operation. Additionally, a staff member of the statewide Sonar and Technical Services Unit will assist with the operation of the sonar to insure that the project is conducted to ADFG specifications.

Hourly escapement data from tower observations at Wood River will be obtained from the ADFG after field observations have been completed. Hourly, daily, and seasonal tower counts will be compared to sonar counts. The project should be conducted for three years in order to fully evaluate potential error in total annual escapement.

PROJECT IMPLEMENTATION

The project will be conducted by Dr. Greg Ruggerone, Natural Resources Consultants, Dr. Donald E. Rogers, Fisheries Research Institute, University of Washington, and Al Menin who developed the Bendix sonar. This team brings a strong background in salmon escapement techniques, salmon ecology, hydroacoustic applications, field investigations, and knowledge of the proposed test site.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The ADFG has two Bendix sonar units available for this project and has approved the use of the equipment for the project. Al Menin, who developed the Bendix sonar and inspects the operation of Bendix sonar by the ADFG, will assist with the setup, calibration, and general operation of the sonar. Additionally, a staff member of the statewide Sonar and Technical Services Unit will assist with the operation of the sonar to insure that the project is conducted to ADFG specifications. The sonar crew will stay at the University of Washington's field station at the outlet of Lake Aleknagik, approximately five miles from the likely sonar site. Boats and supplies will be provided through the field station.

FY 95 BUDGET ($K)

Personnel	54.0
Travel	7.7
Contractual	0.0
Commodities	15.5
Equipment	2.1
Total	79.3

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Project 95053

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

FORMAT FOR IDEAS FOR RESTORATION PROJECTS

Title of Project: Cordova's Mini Imaginarium

Justification: Service and education -- To understand the impacts of the EXXON VALDEZ oil spill and ongoing activities to restore the damage.

Description of Project: (e.g. goals(s), objectives, location, rationale and technical approach)

Everyone loves "hands-on" experiences. The best possible way to help someone learn is to provide them with an experience they can see, hear, smell and feel. The oil spill had a tremendous impact upon Prince William Sound and its communities. A mini-imaginarium in Cordova would provide the perfect means to help residents and visitors, young and old, learn more about the Sound and the impacts of the oil spill.

The mini-imaginarium would be modelled after the very successful Anchorage Imaginarium. Realistic displays and hands-on activities exploring our abundant and diverse wildlife, varied habitats, oil spills and other hazarouds waste problems, impacts, response mechanisms, clean-up technology, energy conservation, among others, would be exhibited.

The project would be completed over a period of two years. The first year would be dedicated to planning which would include building plans and renovations. The second year would be dedicated to creating exhibits and interpretive displays, acquiring educational materials and hiring and training staff.

The mini-imaginarium, potentially located on the docks of Cordova next to the Prince William Sound Science Center, would be a first-rate creative learning environment providing valuable experiences in oil-related areas, encouraging a better understanding of Prince William Sound and promoting educated decision-making for all ages.

Estimated Duration of Project: Two years for planning and set-up; ongoing support will be sought from other funding sources.

Estimated Cost per Year: $62,589 each year

Other Comments: A cooperative agreement is being established with the U.S. Forest Service, Chugach Ranger District, acknowledging 1) the need for an imaginarium/environmental education center, and 2) the willingness of both parties to work together to fulfill this need. Negotiations are underway for the use of a Forest Service warehouse as the basic structure.

More detailed information is available from the Science Center's Education Coordinator, Beth Trowbridge.

Project 95053

Name, Address, Telephone:

Dr. G.L. Thomas, Director
Beth Trowbridge, Education Coordinator
Prince William Sound Science Center
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Cordova, AK 99574
(907) 424-5800 — FAX 424-5820

Oil spill restoration is a public process. Your ideas and suggestions will not be proprietary, and you will not be given any exclusive right or privilege to them.

Prehistoric Ecological Baseline for Prince William Sound

Project Number:	95055
Restoration Category:	Research
Proposed By:	USFS
Cost FY 95:	$144,500
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

The mosaic of contemporary ecosystems in Prince William Sound are subject to intensive study by specialists from a variety of specialties. These ecosystems represent a biological snapshot in time - only one condition among many over the past 10 millennia. Most restoration projects are providing information only on the present condition, the latest manifestation of a changing ecosystem mosaic. The ecosystems which found root at the end of the Pleistocene and the beginning of the Holocene have changed over time to their present states, and will continue to change in the future. To more adequately understand the present ecosystems and to better forecast the future condition the changes in the ecosystem over the past several thousand years needs to be more fully studied.

The proposed project is a multidisciplinary endeavor to acquire ecological information from the past, using information gathered on biological species, on geomorphologic structures, and on archaeological remains. Information on climactic changes, species types and distributions, the effects of glaciation and tectonic events, and the role of humans as part of the ecosystems will be gathered and correlated. The goal is to establish an ecosystem baseline of the Prince William Sound, on decadal and millennial time scales, which will be usable by researchers into rates and degrees of contemporary species recovery, and which will be extendible to (or provide the basis for additional work considering) other areas affected by the EVOS. The project could address potentially each of the injured biological resources, but will concentrate on those represented in archaeological contexts in Prince William Sound. Specifically addressed will be nonrecovering resources such as clams and mussels, harbor seals, salmon, and sea otter.

Additional information may address various seabirds, killer whales, and animals not categorized as injured by the EVOS. The results will also address archaeological resources and subsistence uses.

NEED FOR THE PROJECT

Over time, Prince William Sound has developed productive and biologically diverse ecosystems, supporting plant and animal species, as well as the people who depended on them. This information may be used by researchers of the contemporary ecosystems to assess where contemporary population numbers and distributions fit within long-term trends. This, in turn, would provide additional information to managers about expected recovery times, especially if climate and other factors are determined to be important indicators of cyclical fluctuations in biological resources. It may provide great insight into natural causes that may be limiting recovery. The role of humans in the ecosystem of Prince William Sound is important because people have utilized a broad spectrum of resources throughout much of the Holocene. Archaeological sites function as preservers and concentrations of biological data. The archaeological context provides the link between temporal and geographic distribution for ecological data. This information is only available through geomorphological, paleobiological, and archaeological study.

The proposed project should be considered a pilot study. The project will include a synthesis of findings and results, and will assess the need for additional information in consultation with other researchers and representatives from the Trustee Council. The project will allow adaptive modification of methods and questions in view of results and EVOS restoration management needs for long-term research on ecosystem processes.

PROJECT DESIGN

A. Objectives

1. Review archaeological, geomorphological, climatological, and paleobiological information available for Prince William Sound;

2. Contact interested public groups, communities, and individuals to encourage participation in project planning, design, implementation, and review.

3. Conduct coordinated and integrated fieldwork to gather appropriate data from sufficient sources to produce a base for a paleoecological model for Prince William Sound.

4. Complete analyses of literature review and gathered data, and produce a report for the Trustee Council on findings and recommendations. This document will be of

professional scientific standard.

5. Complete and make public a summary of research and findings. This document will be less technical, geared to the general public, and will be used to solicit public input on process, methods, findings and conclusions.

B. Methods

Archaeology: Review of literature and existing collections of faunal material, and correlation with cultural and temporal indicators will provide a guide to where additional materials may be needed through controlled excavations at site(s) within Prince William Sound. Samples of soils, animal bones, shells, pollen, and other organics from existing collections and selected archaeological sites will be used to conduct radiocarbon, stable isotope, and other analyses for paleoecological reconstructions.

Geomorphology: Review of existing literature on the geomorphology of Prince William Sound (especially glacial history, sea level changes, and tectonic displacement) will provide a guide to where additional data may be needed through field observations and sampling. Geologic mapping and geomorphological studies will be used to develop a model of landform transformation and sea level/landform relationships for the Holocene. This will be used to identify possible early habitat for specific species/species groups and for human occupation.

Paleoclimatology: Review of existing literature on pollen, diatom and other sedimentological studies and other climatic indicators for Prince William Sound will provide guidance to where additional field samples are needed to best tie together the archaeological and geomorphological data. Coring of selected bogs and/or lakes will provide additional samples that will be used to accomplish that objective.

Overall: The archaeologists, geomorphologists, paleoclimatologists, and other specialists will work as an integrated team, using known archaeological sites as a focus for information gathering. Standard procedures established for Arctic and Subarctic regions will be used for all studies. The facilities and expertise of the USDA Forest Service (Chugach National Forest) and the University of Alaska Fairbanks will be used collaboratively - with public involvement - to accomplish the stated objectives.

C. Schedule

Pre-field activities (public contacts, literature reviews, collection identification and permitting): Winter/Early Spring, 1995.

Field activities (archaeological excavations, geomorphological studies, pollen and other sample gathering): May through September, 1995.

Data compilation and analysis (collaborative mapping, radiocarbon, pollen, O_{18}, and other analyses): September through November, 1995.

Final Technical Report for Trustee Council: By April 15, 1996.
Final Public document: By April 15, 1996.

D. Technical Support

Special analyses: Radiocarbon analyses will be conducted by Beta Analytic or Washington State University Radiocarbon Laboratory. Geologic and pollen analysis will be conducted by the University of Alaska. Other specialized analyses will be conducted in accordance with the project team specialists' established procedures.

Transportation: Pre-field investigations will determine the number and locations of data gathering sites. An analyses will be conducted once the locations are selected to determine the most cost effective mode of transportation and field support, whether a float-plane or boat based operation.

E. Location

Specific sites will be selected in the pre-field phase, but it is anticipated that three general areas will be selected for field investigations: one in the Western, one in the Eastern, and one in the Southern parts of the Sound. Tatitlek, Cordova, Chenega Village, Valdez, and Whittier will be contacted during planning and after the fieldwork is completed.

PROJECT IMPLEMENTATION

The proposed project is envisioned as a collaborative effort between agencies, universities, and the public sector. The project requires a high level of expertise in a number of disciplines, expertise that is available through Alaska-based institutions. It may be possible to offer the project through a competitive contract process. Since the locations for the projects are likely to be on State or Federal lands, projects would require monitoring and permitting through the land managers. Cooperative projects with Native organizations are possible and will be pursued in the planning stages of the project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The project implementation, analyses, and reporting will be conducted collaboratively by team specialists. In addition, information sharing with biologists with specialties in contemporary species will be integrated into the project from the beginning through reporting. Fieldwork will be coordinated as much as possible with other projects efficiently use transportation, supplies, and information distribution systems. Projects which will be coordinated with include the archaeological site stewardship and monitoring project (lead agency:ADNR). The methodology and information will be compatible with that of other funded projects, such as that

of D.Schell and T.Kline (UAF) dealing with modern food web dynamics and ecosystem changes.

FY 95 BUDGET ($K)

	USFS	UAA	Total
Personnel	21.7	56.7	78.4
Travel	5.5	12.7	18.2
Contractual	0.0	9.5	9.5
Commodities	0.6	5.4	6.0
Equipment	0.0	20.0	20.0
Subtotal	27.9	104.2	132.1
Gen. Admin.	3.3	9.2	12.4
Total	31.1	113.4	144.5

Spruce Bark Beetle Infestation Impacts on Injured Fish and Wildlife Species of the *Exxon Valdez* Oil Spill

Project Number:	95060
Restoration Category:	Research
Proposed By:	ADFG
Cooperating Agency:	USFS
Cost FY 95:	$213,900
Cost FY 96:	Unknown
Total Cost:	Unknown
Project Duration:	Minimum of 2 years
Geographic Area:	Prince William Sound, Kenai Peninsula, Gulf of Alaska
Injured Resource/Service:	Multiple resources

INTRODUCTION

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

Injured resources that will benefit from this project include : marbled murrelet, harlequin duck, pink salmon, sockeye salmon, Dolly Varden, cutthroat trout, river otter, bald eagle, and the forest ecosystem upon which they depend and with which they interact.

NEED FOR THE PROJECT

This project will provide information describing the geographic extent of spruce bark beetle infestation within the range of habitats previously demonstrated to be important to the EVOS species. The project will identify specific critical habitats for each applicable injured species and evaluate impacts to these critical habitats resulting from SBB infestations.

PROJECT DESIGN

A. Objectives

1. Determine the role of the spruce forest as habitat for each of the injured species.

2. Evaluate whether the current and potential level of spruce bark beetle infestation within the EVOS area is impacting injured species habitats.

3. Increase existing knowledge levels of SBB infestation impacts on injured fish and wildlife species through intensive literature searches of automated databases, contacts with governmental agencies at the state, provincial, and federal levels in Canada and the U.S.

4. Increase public awareness of current and potential impacts of SBB infestations on injured species habitats through multi-media presentations.

5. Enhance the capability of Alaskan biologists, foresters, and land managers to access information and communicate with professional counterparts throughout Alaska and in other states and provinces.

B. Methods

1. Identify critical habitat requirements of each injured species

   a. Review existing studies and conduct intensive literature review to supplement with additional information
   b. Interview principal investigators for each species
   c. Compile existing databases (e.g., Anadromous Stream Atlas) for spill area
   d. Based upon 1-3 above, characterize and map critical habitat for each injured species in GIS

2. Identify the historic, current, and potential geographic distribution of spruce bark beetle infestations

   a. Conduct an intensive review of historical literature
   b. Compile and reconcile all existing GIS-based maps and databases
   c. Evaluate potential infestation areas using USFS Spruce Beetle Expert software
   d. Cooperate directly with USFS and DNR/DOF entomologists in achieving 1-5
   e. Based upon 1-4 above, produce GIS map layers depicting the distribution of historic, current, and future beetle infestation ranges

3. Define the degree of overlap between the geographic distribution of critical habitat for each injured species and the historic, current, and potential ranges of SBB infestation.

a. Using GIS analytical techniques, overlay the bark beetle infestation ranges with the critical habitat maps for each species
b. Evaluate the degree of overlap by species and geographic region

4. Identify primary and secondary effects of SBB infestations on the landscape

a. Conduct a thorough literature review
b. Based upon the critical habitat characteristics compiled in A.4, describe changes in infested stands that might affect injured species

1) Evaluate changes via appropriate field methods (plots, transects, evaluations of adjoining uninfested stands)
2) Evaluate appropriate characteristics of comparably infested stands

c. Cooperate with USFS and DOF entomologists and silviculturalists as well as appropriate agency personnel in other states and Canadian provinces
d. Based upon 1-3, describe the impacts of spruce bark beetle infestations on the critical habitat components of injured species

5.. Evaluate whether the results of 4(d) are significant by species and by region

6. If the results from section 5 above, or a portion thereof, are affirmative, determine appropriate responses

a. Identify plausible habitat management responses to ameliorate infestation impacts
b. Compare the impacts to critical habitats of injured species resulting from "no management action" strategy with the suite of management responses developed in 6(a) above
c. Recommend appropriate habitat management responses by species by region
d. Identify knowledge gaps.

7. Develop recommendations to aid EVOS Trustee Council habitat acquisition process

8. Produce a multi-media presentation specifically designed for public use that will increase public awareness of current and potential impacts of SBB infestations on injured species habitats

9. As the majority of bark beetle impact information is not contained in the conventional literature, establish an INTERNET discussion group for biologists, foresters, entomologists, land managers, and other interested parties. This forum will provide an opportunity for free exchange of technical literature and habitat management information, encourage the influx of new problem-solving techniques, and will improve our limited abilities to readily communicate with other professionals due to travel constraints. Naturally, this forum could also be available to public users or public interest groups.

C. Schedule

October 1, 1994 - December 31, 1994

* Project planning and mobilization of GIS
* Initiate literature reviews
* Initiate planning for multi-media presentation
* Public meeting
* Identify and map critical habitats
* Complete establishing INTERNET discussion forum

January 1, 1995 - March 30, 1995

* Mapping ranges of SBB infestations
* Compare SBB infestation ranges with critical habitats
* Initiate field analyses

April 1, 1995 - June 30, 1995

* Complete production of multi-media presentation
* Continue field analyses
* Develop recommendations
* Completion of annotated bibliography database
* Analysis of mapped information
* Evaluate effects of SBB infestation and impacts analysis
* Develop recommendations for habitat acquisition process

July 1, 1995 - September 30, 1995

* Complete field analyses

October 1, 1995 - December 31, 1995

* Complete writing final project report
* Assemble project components for submission
* Public meeting to review project results

D. Technical Support

The following areas of technical support will be needed and utilized to accomplish this project:

* GIS
* Cartography
* Forest Ecology
* Fisheries Biology
* Wildlife Biology
* Professional Library Services
* Multimedia Production

E. Location

The project will include all of Prince William Sound, the area east of Cordova to the Copper River, the Kenai Peninsula, western Cook Inlet to Cape Douglas, and the Kodiak Archipelago.

PROJECT IMPLEMENTATION

This project will be conducted as a cooperative effort between the Alaska Department of Fish and Game and the U.S. Forest Service-State and Private Forestry. Actual day-to-day project management responsibility will be designated to the ADFG. S&P has the longest experience and greatest expertise in spruce bark beetle biology, distribution, and management in Alaska. The same is true for the ADFG with respect to all injured species except for marbled murrelets and bald eagles. In addition, the department has played an active role in bark beetle management planning with the USFS and the DOF.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The project will be a cooperative effort between the Alaska Department of Fish and Game (ADFG) and the U.S. Forest Service - State and Private Forestry (S&P). Other cooperators include the Alaska Department of Natural Resources, Division of Forestry (DOF), Division of Parks and Outdoor Recreation (DPOR), and the U.S. Fish and Wildlife Service (FWS). The project will utilize data and mapped products compiled by the Habitat Work Group and work completed by species principal investigators. All computerized products resulting from this project will be produced in a format that will allow easy integration into the Exxon Valdez Information Management System.

(DETAILED FY 95 BUDGET NOT PROVIDED)

PWSAC Pink Salmon Fry Mortality

Project Number:	95065
Restoration Category:	Research
Proposed By:	Prince William Sound Aquaculture Corporation
Lead Trustee Agency:	ADFG
Cost FY 95:	$59,600
Cost FY 96:	$60,200
Total Cost:	Unknown
Duration:	Unknown
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon

INTRODUCTION

Pink salmon hatcheries operated by the Prince William Sound Aquaculture Corporation annually release approximately 400 million pink salmon fry from three hatcheries located in the northern, northwestern, and southwestern corners of Prince William Sound. Since the EVOS, PWSAC has observed unusual mortality in second and third generation of the odd year cycle pink salmon that returned through oil in 1989. Abnormally high pink salmon fry mortality (5% - 15%) occurred at Cannery Creek Hatchery in 1992 just prior to and after salt water entry. In 1994, similar mortality occurred at both AFK Hatchery (18%) and again at Cannery Creek Hatchery (7%).

NEED FOR THE PROJECT

This project will determine the cause of mortality and provide recommendations for reducing mortality and restoring the pink salmon production to its pre-spill level.

PROJECT DESIGN

A. Objectives

These will be detailed and forwarded to the EVOS Office.

B. Methods

(Information not provided.)

C. Schedule

(Information not provided.)

D. Technical Support

The PWSAC salmon program receives technical support from permitting agencies, University of Alaska Fairbanks, University of Alaska Juneau, and PWS Science Center. The ADFG pathology lab, genetics lab, and coded wire tag lab are among specific expertise areas overseeing the hatchery salmon program.

E. Location

This project will take place in PWS at the Armin F Koernig Hatchery on Evans Island, the Wally Noerenberg Hatchery on Esther Island, and the Cannery Creek Hatchery in Unakwik Inlet.

PROJECT IMPLEMENTATION

PWSAC will implement the project in conjunction with ADFG as the lead agency.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	52.5
Commodities	0.0
Equipment	0.0
Subtotal	55.5
Gen. Admin.	4.1
Total	59.6

Monitoring Nearshore Fish Species for Persistence of Oil Exposure and Ecotoxicological Effects

Project Number:	95071
Restoration Category:	Research
Proposed By:	NOAA
Cost FY 95:	$231,000
Cost FY 96:	$46,500
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound and nearshore habitat along the Alaskan and Kenai Peninsulas
Injured Resource/Service:	Subtidal organisms

INTRODUCTION

There has been persistent oil exposure of the nearshore subtidal habitat, and this project proposes to continue recovery monitoring of the benthic fishes of this ecosystem component, together with making a final effort to ascertain any biological dysfunctions resulting from persistent exposure. The results from this study will 1) delineate the geographic areas where subtidal oil contamination is continuing; 2) allow a determination of the rate of recovery, if any, for those areas which were still showing persistent exposure into 1992 and 1993; 3) allow a determination of ecotoxicological effects in the benthic fish compartment of the Prince William Sound and Kenai/Alaskan Peninsula nearshore habitat. The need for incorporation of this compartment into the ecosystem studies of Prince William Sound have been clearly stated in the Implementation Management Structure workshops in Anchorage, and in the Cordova planning and review workshop for the Sound Ecosystem Assessment proposal. Portions of this type of study have been previously funded by the NRDA and Restoration programs, under Fish/Shellfish 24b and 24, Subtidal 7, and Subtidal 1. Funding was stopped after the 1991 and 1993 collections, but analyses of the final collections made under these projects have shown a continuation of exposure at some sites both inside and outside the Sound.

NEED FOR THE PROJECT

There has been extensive and continuing exposure of nearshore subtidal fish species to oil in

and around Prince William Sound following the EVOS, as documented in Progress Reports and the Final Report from F/S 24 (1989 and 1990), ST 7 (1991), and ST 1 (1993). Biological exposure, while generally decreasing with time in species examined in these studies, could nevertheless still be documented in 1991 and 1993. There are some data to suggest that oil has moved from intertidal areas to deeper sediments, due to wind and wave action, and also perhaps due to some cleanup procedures. However, sampling of subtidal sediments in 1993 and 1994 failed to show any detectable hydrocarbons derived from the *Exxon Valdez*. Biological monitoring, however, allows for integration of overall contamination of a geographic area and thus may be a more sensitive measure of subtidal contamination. Because of the ecological importance of the benthic community to ecosystem modeling efforts, the rates and extent of natural recovery of these species need to be determined. In addition, it is critical to determine if the demonstrated persistent exposure of this community has resulted in any biological dysfunction that may impact the ecosystem as a whole.

PROJECT DESIGN

A. Objectives

1. Collect three flatfish species (rock sole, flathead sole, and yellowfin sole) from six sites inside Prince William Sound in May and June of 1995 and four to six sites along the Kenai and Alaska Peninsulas in May and June of 1996, at depths from 10-30 meters.

2. Analyze liver samples for levels and/or activities of cytochrome P450 1A (CYP1A) and bile samples for levels of fluorescent aromatic compounds (FACs) in order to determine oil exposure and biochemical effects in the collected animals.

3. Analyze liver samples for evidence of DNA damage

4. Assess histopathological alterations in several tissues, including liver, kidney, gonad, and gill.

5. Assess reproductive function in males and females (primary target species is yellowfin sole), utilizing histopathological methods, levels of circulating sex hormones, and appropriate biomarkers of reproductive function.

6. Measure levels of petroleum-derived compounds in stomach contents of collected animals.

7. Provide synthesis reports in February of 1996 and 1997 detailing levels of oil exposure and associated ecotoxicological effects in benthic fish species from Prince William Sound (1996) and the nearshore habitats of the Kenai and Alaska Peninsulas (1997).

B. Methods

Methods are as described in previous detailed study plans and final and progress reports, and in previous peer-reviewed publications. Summaries of these methods and appropriate citations can be found in:

Collier, T.K., C.A. Krone, M.M. Krahn, J.E. Stein, S.-L. Chan, and U. Varanasi. (1994). Petroleum exposure and associated biochemical effects in fish following the *Exxon Valdez* oil spill 1. 1989-1991. Submitted to Trans. Am. Fish. Soc.

Collier, T.K., M.M. Krahn, C.A. Krone, L.L. Johnson, M.S. Myers, S.-L. Chan, and U. Varanasi. (1993). Oil exposure and effects in subtidal fish following the *Exxon Valdez* oil spill. In: Proceedings 1993 International Oil Spill Conference pp 301-305.

C. Schedule

January, 1995	Contract for vessel support
March, 1995	Solicit public input concerning sites and additional target species, especially from subsistence consumers
April/May, 1995	Finalize cruise plans and schedule
May/June, 1995	Field collections in Prince William Sound
June-October, 1995	Analysis of collected samples
September, 1995	Submission of report detailing samples and species collected
January, 1996	Submission of draft synthesis report
January, 1995	Contract for vessel support for year 2
February, 1996	Submission of final synthesis report covering Prince William Sound collections and results
March, 1996	Solicit public input concerning sites and additional target species to be sampled outside Prince William Sound, especially from subsistence consumers
April/May, 1996	Finalize cruise plans and schedule
May/June, 1996	Field collections along Kenai and Alaskan Peninsulas
June-October, 1996	Analysis of collected samples
September, 1996	Submission of report detailing samples and species collected
January, 1997	Submission of draft synthesis report
February, 1996	Submission of final synthesis report for Kenai/Alaskan Peninsula sites

D. Technical Support

The Environmental Conservation Division has most of the required equipment and facilities for performing this project. The only anticipated costs are for vessel support each year and nets to be purchased in the first year. The ECD has in-house facilities and personnel to carry out the field sampling and sample handling, all biochemical and chemical analyses, data compilation and analysis, and sample and data archival.

E. Location

The proposed project will be undertaken at several sites in Prince William Sound and along the Kenai and Alaskan Peninsulas. Possible sites within Prince William Sound include Olsen Bay, Snug Harbor, Sleepy Bay, and Squirrel Bay. Outside the Sound, sites may include Tonsina Bay, Hallo Bay, Resurrection Bay, and sites on Kodiak Island. To the extent that there is a desire on the part of native Alaskans to have additional sites sampled, attempts will be made within the budget confines to accommodate these requests.

PROJECT IMPLEMENTATION

It is proposed that this project be implemented by the Environmental Conservation Division (ECD) of the Northwest Fisheries Science Center of NOAA, NMFS. This group has been the lead agency on several similar projects in the past, and has all requisite technical expertise and equipment. This project is proposing to use state-of-the art techniques for determining oil exposure and determining ecotoxicological impacts of such exposure in nearshore subtidal species. These techniques have been largely developed, or optimized for use on oil-exposed organisms, by researchers in the ECD. The Division has demonstrated its ability to provide sound chemical, biochemical, and biological data on a timely basis, both under the NRDA process and for the Subsistence Science Project, following the EVOS. Moreover, this Division has considerable experience with sampling in and around Prince William Sound, and knowledge of the distribution of the species of interest. To our knowledge there are no other groups with the combination of chemical, biochemical, and biological expertise sufficient to conduct an ecotoxicological study of this magnitude in Alaskan waters.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The results from this project will be integrated into the overall ecosystem studies of Prince William Sound that will be conducted in FY95 and FY96. It is anticipated that an evaluation of any continuing ecotoxicological impacts in the nearshore benthic habitat will be available for the proposed annual ecosystem workshops, provisionally scheduled for winter 1995/1996 and 1996/1997. As appropriate, platforms and sampling gear will be shared with other projects that will be in the field at the same time as proposed in this study.

FY 95 BUDGET ($K)

Personnel	129.8
Travel	7.0
Contractual	25.0
Commodities	33.0
Equipment	15.0
Subtotal	209.8
Gen. Admin.	21.2
Total	231.0

Impact of Killer Whale Predation on Harbor Seals in Prince William Sound

Project Number:	95073
Restoration Category:	Research
Proposed By:	NOAA, Alaska Fisheries Science Center National Marine Mammal Laboratory, Seattle, WA
Lead Trustee Agency:	NOAA
Cost FY 95:	$228,200
Cost FY 96:	$208,900
Total Cost:	Unknown
Duration:	3 years (2 field + analysis and report)
Geographic Area:	Prince William Sound, Alaska
Injured Resource/Service:	Harbor seal

INTRODUCTION

Killer whales are classified as top predators of the marine ecosystem with diets that vary regionally and seasonally. Two life-history patterns, involving two forms of killer whales termed resident and transient, have been suggested for the whales occupying the waters of Puget Sound, Washington and British Columbia. One of the criterion used to differentiate the two forms is diet. Resident whales are thought to feed primarily on fish whereas transients are thought to feed primarily on marine mammals. Both forms of killer whales have been described from Prince William Sound. In Prince William Sound, predation by killer whales occurs on at least three injured resources: harbor seals, salmon, and herring. To predict the relative impact that killer whale predation may have on these injured resources, the level of predation and the relative proportion of each species consumed by killer whales must be quantified.

Current information on the dietary habits of killer whales are based on 1) observations of feeding events, and/or 2) stomach content analyses from stranded animals. Although both methods of determining food habits of killer whales are valid, each approach has significant limitations. Observations of feeding events may only represent the localized distribution of prey in an area. In many cases target prey consumed by the whales may be hard to determine. Since killer whales rarely strand, few stomach contents have been examined. Stomach contents represent a one time and fairly recent feeding event or series of events and this could

misrepresent the relative contribution of the prey item found in the stomach. Other problems associated with stomach content analysis are that the stomach contents may either represent something that the prey has eaten or a by-catch from an attempt to capture other prey.

The objective of the proposed project is to investigate the potential impact of killer whale predation on Prince William Sound harbor seal populations. We will collect biopsy samples from 40 killer whales from each of two putative populations (suspected resident and transient whale populations) from Prince William Sound. Killer whale skin and blubber samples will be examined through stable isotope and fatty acid analyses to determine the fraction of the Prince William Sound killer whale population that predates on marine mammals versus fish. In addition to obtaining dietary preferences of killer whales through biopsy sampling, our investigations will also include studies to determine population energetics of killer whales. Researchers working with killer whales and harbor seals will collaborate (Integrative Marine Mammal Ecosystem Program, to construct a model of killer whale predation on Prince William Sound harbor seal populations.

NEED FOR THE PROJECT

The effect of predation on the recovery rates of injured resources has been defined as a priority research issue by the EVOS Trustee Council. Information gathered during the killer whale study will be integrated with other studies (Marine Mammal Ecosystem Package) to provide a greater understanding of ecosystem processes in Prince William Sound and will enable us to predict the relative impact of whale predation on harbor seals. Additional insights regarding the relative impact of killer whale predation on herring and salmon will also be obtained during the course of these studies.

PROJECT DESIGN

A. Objectives

1. Determine short-term and long-term diets of Prince William Sound killer whales.

2. Compare dietary preferences of transient and resident killer whales in Prince William Sound.

3. Determine the potential impact that killer whale predation may have on Prince William Sound harbor seals and other injured resources, as appropriate.

B. Methods

Killer whale tissue samples will be collected using a biopsy dart. We plan to use an air pistol

powered by a CO_2 cartridge. We chose the CO_2 system because it allows the force of impact to be more precisely controlled. The dart size is 6mm by 25mm (diameter x depth) and the airgun dart is plastic to reduce the weight (less than 10 g) and improve flotation. The dart is collected free floating after sampling.

Samples will be subjected to stable isotope ratio analysis, fatty acid signatures and fatty acid isotope ratio analysis. Stable isotopes analysis has become a powerful tool in the studies of marine food webs. The ratio of heavy to light isotopes in a sample varies between organisms. An organism has an average of 1-2 ppt (parts per thousand) difference than it prey for carbon and 2-5 ppt for nitrogen. Using both carbon and nitrogen increases the resolution of the analysis. It may also be possible to rule out the presence of a certain species.

Analysis of fatty acid composition can be done from various tissues of an animal to determine the presence of fatty acids that are unique to potential prey. The lipids of the prey are hydrolyzed in the stomach and small intestine into fatty acids as well as glycerol and monoglyceride. Fatty acids remain intact during digestion. Therefore comparisons of the fatty acid composition of potential prey with blubber of the predator makes it possible to determine which prey was consumed. Many fatty acids can be attributed to a single phylogenetic group or species from a specific community. However, it may not always be possible to assign a species on the basis of one or two free-fatty acids. Thus it is necessary to consider an array of fatty acids present and then match the pattern present in the tissue with the pattern in the potential prey. This technique has the added advantage of enabling an assessment of the relative contribution of different prey types. Therefore, the presence of certain fatty acids can act as trophodynamic tracers. Analysis of carbon and nitrogen stable isotopes of a fatty acid will decrease noise and increase resolution in prey determination.

Longer term estimates of diet are required to more fully address food web dynamics. Although killer whales are considered top predators (defined as a species that is not eaten by any other species in the food web), this information alone does not allow for quantitative analysis or comparisons to be made between or within food webs. It is necessary to determine how many trophic levels or successive energy transfers occur between basal and top level species. This has important implications for the flow of energy and material through the ecosystem. The trophic level at which a predator feeds will determine the relative efficiency of that consumer and dictate much about the life history patterns and demographics of those animals. Further, the trophic level may change spatially as well as temporally, which affects the dynamics of resource utilization as well as the potential for concentration of environmental pollutants. Prey species consumed by predators may be the same over the course of the year, but could in fact represent different trophic levels depending upon the time of year and environmental conditions.

Trophic level can be determined on the basis of the isotopic analysis of the ratio of heavy to light nitrogen $^{15}N/^{13}N$, in the blubber and skin. Animals average from 3 to 5 parts per thousand (ppt) heavier in dietary nitrogen. In terms of food webs, nitrogen isotope values increase 10-15 ppt in many food webs due to the presence of 3-5 successive trophic transfers. Each transfer

increases the ^{15}N content by 3-4 ppt. Comparison of stable isotope ratios of tissue samples of predators (e.g., killer whales) with those of potential prey (e.g., harbor seals, salmon, herring, etc.) makes it possible to determine the diet of a species, as well as the trophic level at which they are feeding.

Of equal importance to the work being conducted on stable isotope and fatty acid analysis, we also propose to study foraging strategies and population energetics of killer whales. Information pertinent to these studies will be collected during field work and with captive killer whales. These data, in conjunction with the results obtained from analyses of skin and blubber samples, will be an integral part of a model we are developing to determine the impact of predation by whales on seals as well as other injured resources.

C. Schedule

This study will be conducted during 1995 and 1996, with either a recommendation for additional field studies or submission of a final report in 1997. The field season will operate from July to September each year. Data analysis will occur between October 1995 and February 1996. An annual report (summarizing 1995 research) will be submitted in April 1996 and in April 1997 (summarizing 1996 research). A final report will be submitted by 30 September 1997. Results will be prepared for publication in peer-reviewed journals.

D. Technical Support

Technical support will be provided by the research/administration staff of the Alaska Fisheries Science Center, National Marine Fisheries Service, National Marine Mammal Laboratory, Seattle, Washington. Laboratory analyses of killer whale tissues will be done by agencies or institutions other than NMFS/NMML. Research staff at Sea World (California and Florida) will assist with studies on captive killer whales.

E. Location

Field work conducted under this project will be restricted to Prince William Sound.

PROJECT IMPLEMENTATION

This study will be coordinated by staff at the National Marine Mammal Laboratory. NMML personnel have over 20 years experience conducting killer whale research in Alaska. NMML has designed and coordinated all previous killer whale NRDA and restoration monitoring and research studies (1989-91 and 1993). NMML will work closely with Alaska Department of Fish and Game biologists, scientists conducting laboratory studies on stable isotope and fatty acid analyses, biologists conducting captive killer whale studies, and other Principal Investigators, as appropriate.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is part of an integrated Marine Mammal Ecosystem package and as such is multi-disciplinary and would involve the collaborative efforts of many Federal and State Agencies, and includes the participation of Universities and private individuals. An integrated approach is absolutely critical to the overall success of this project and mandatory to obtain the desired results of this work. Studies in this package include this project (Impact of killer whale predation on harbor seals); Harbor Seal Monitoring, Habitat Use, and Trophic Interactions (ADF&G); Harbor Seal Condition and Health Status (UAF); and Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers (UAF). In addition, this study will be closely integrated with Herring (ADFG) and Oceanographic (UAF) studies being submitted under the SEA plan and with the Forage Fish study being developed.

FY 95 BUDGET ($K)

Personnel	23.0
Travel	6.0
Contractual	161.0
Commodities	23.5
Equipment	0.0
Subtotal	213.5
Gen. Admin.	14.7
Total	228.2

Recreation Impacts In Prince William Sound: Human Impact As A Factor Constraining Long Term Ecosystem Recovery

Project Number:	95077
Restoration Category:	Research
Proposed By:	The National Outdoor Leadership School (NOLS)
Lead Trustee Agency:	ADNR
Cost FY 95:	$117,000
Cost FY 96:	Unknown
Total Cost:	Unknown
Geographic Area:	Prince William Sound
Duration:	5 years
Injured Resource/Service:	Recreation and tourism

INTRODUCTION

As a consequence of the *Exxon Valdez* oil spill, recreation in Prince William Sound (PWS) has been significantly affected. Recreationalists are now seeking areas that have not been disturbed by the spill and heretofore received little or no use. Moreover, areas that have been previously impacted by recreation are now seeing additional visitation. The National Outdoor Leadership School (NOLS), for example, has altered sea kayaking routes since the spill, resulting in a concentration of use. Since many other kayakers, fishermen, and hunters use these areas the potential for degradation of these sites is high. Little is currently known about the extent of use in these areas, or the resistance, resilience and tolerance of specific sites to recreation disturbance.

The proposed research addresses the issue of human impact in Prince William Sound. Is human impact a factor constraining long term ecosystem recovery? Results of this work will be provided to the Trustees, land management professionals and users to assist in appropriate utilization and management of the spill affected area.

NOLS Background: The National Outdoor Leadership School is a non-profit educational institution. Research, publications, outreach and training, and other programs are central to the school's mission to be a leader in wilderness education and research.

NOLS has been instructing expedition-length sea kayaking courses in the PWS area since 1971. As a consequence, we have extensive expertise on recreation areas, visitation, and user impact. This knowledge, combined with our research capacity, will contribute to an effective research process that results in usable and practical outcomes.

PROJECT DESIGN

We propose a three phase study with the following overall objectives:

1. Qualifying and quantifying use and impact from recreationalists.

2. Determining the tolerance of specific ecosystem types to user impact.

#. Examination of ecosystem processes altered as a consequence of user disturbance.

Phase I: Site Surveys and Assessment

Using monitoring and assessment techniques specifically designed for recreation sites, we would conduct an overall evaluation of recreation sites in the area. In addition, visitor, outfitter and land management surveys would be conducted to assay the numbers and demographics of area users. This would be a two year study and would consist of initial site identification and subsequent impact assessment and monitoring. Data from the initial identification and assessment would assist the development of Phases II and III.

Phase II: Site Tolerance to User Impact: Trampling and Experimental Camping

Although the information regarding the tolerance of specific sites to recreational disturbance is not extensive, accurate experimental methods have been developed and studies have been conducted in many backcountry areas. We propose to employ the techniques suggested by Cole and initiate a five year study on at least four distinct soil-plant associations impacted by recreational use. This study would involve both experimental campsites and applied trampling treatments and examine vegetation resistance, resilience and tolerance to user impacts. Changes in plant species composition, soil compaction and beach erosion would also be quantified. The first three years would involve applied trampling and camping treatments and assessment. Extensive follow-up measurements would be conducted the fourth year, and conclusionary data analysis and publication would be conducted in the fifth year.

Phase III: Recreation Impact: Process Level Research

To date, much of the research pertaining to user impacts on wilderness sites has focused on documenting intensity of use and its impact on vegetation ground covers. This research has greatly improved our knowledge of site durability and where, on a continuum of sensitive to durable, different vegetation types lie.

However, this type of research has been somewhat limited in scope, focusing primarily on site durability and response to impact. More comprehensive research would extend these studies to an examination of the time required for recovery on impacted sites and of the processes that are involved in controlling the rate and success of recovery. We therefore propose to examine a range of ecosystem processes that could be affected by disturbance in conjunction with phase II (above). This would be a two year study with measurements and analysis conducted in year two and four. A partial list of ecosystem processes to be examined is included (Table 1).

Table 1. Proposed soil and plant properties to be measured as an assessment of ecosystem health in sites disturbed by recreation. Not all properties would be appropriate measures at all sites.

Soil Properties	Plant Properties
Organic Matter Content	Biomass Production
Microbial Biomass	Nutrient Analysis
Physical Characteristics	Structural Compounds
C and N Mineralization Potential	Anatomical Damage/Response
	Mycorrhizal Response

NOLS currently has the internal capabilities to conduct all of Phases I and II of this proposal and are collaborating with the Natural Resource Ecology Lab at Colorado State University to conduct the analytical aspects of Phase III.

BUDGET ($K)

Phase I. Site Inventory
2 years x $28,080/yr. + overhead costs $70,200

Phase II. Trampling and Camping
4 years (field) x 28, 580/yr + overhead costs
1yr (analysis) x 12,500/yr + overhead costs $158,525

Phase III. Process Level Research
2 years (field and lab) x $59,260/yr + overhead costs $148,150

Total for all phases, 5 years $376,875

Culture, History, and Ecosystems: An Assessment of Cultural/Historical Strategies to Building Long-term Understanding of Ecosystem Dynamics in the *Exxon Valdez* Oil Spill Area

Project Number:	95078
Restoration Category:	Research
Proposed By:	National Park Service
Lead Trustee Agency:	DOI
Cost FY 95:	$166,650
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2 years
Geographic Area:	Project consists largely of library research with on-site consultation with Native Alaskan communities in the vicinity of the *Exxon Valdez* oil spill area.
Injured Resource/Service:	Multiple resources

INTRODUCTION

What is proposed here is an assessment of the potential value of archaeological, ethnographic, and historical research as sources of long-term comparative data for understanding the ecosystem processes that may be affecting the recovery of injured biological resources. Lack of a long-term perspective on ecosystem dynamics has made it difficult to identify which conditions or changes are related to natural fluctuations or shifts in the ecosystems in contrast to those that may be directly or indirectly linked to the *Exxon Valdez* oil spill event. In this study, archaeological sites, traditional Native Alaskan knowledge, and the historical record would all be evaluated for their specific ability to shed light on the causal factors that might explain current downturns in the health and populations of species that occur on the injured list. Three reports are envisioned, one for each discipline represented--archaeology, ethnography, and history.

NEED FOR THE PROJECT

If we are to understand how the *Exxon Valdez* oil spill event has altered or otherwise affected

present-day nearshore and upland ecosystems and their constituent subsystem components, it is imperative to have a basis for comparison, a point of reference from which to identify and measure changes that might be directly or indirectly attributed to the spill. Ecosystems are not static clockworks, but dynamic systems in a constant state of change and, as emphasized by the paleoecologist E. C. Pielou, they are always characterized by a greater or lesser degree of disequilibrium. Thus, the basis for informed comparison is a moving target, not time-bound portraits of the ecological systems of the Gulf of Alaska as these appeared in a brief snapshot of time on the eve of the oil spill.

How then can we obtain this historical perspective on the ecosystems of the region? One promising source of this long-term ecological data is the archeological record of the area. Archeological sites may be likened to a vast array of fortuitous environmental sampling stations extending back into time. For a period of at least 6000 years, humans along the coast launched out from their settlements and camps and sampled the world about them in their daily subsistence pursuits. The accumulated debris from this massive, but inadvertent environmental sampling effort has been conveniently concentrated in the archeological sites. This record, though often coarse-grained, may offer answers to some of the questions posed by contemporary ecosystem scientists who are trying to discriminate between changes that have links to the oil spill and those that represent fluctuations in natural systems over time.

Another source of long-term data may be found through ethnographic research. Native Alaskans over the past millennia have accumulated a rich storehouse of information about the local environment, and though much of this knowledge has been lost of late, much still survives. The survival of coastal Native peoples has always depended on accurate, empirical observations about the world and the challenges of the environment.

Historical archives may also offer valued information on the operation of the environment in the past. Old fisheries statistics and similar records have already been employed by biological scientists searching for answers in the past to inform the present. It is likely that there is much more to discover, particularly in the broader array of historical sources including personal diaries, official reports and correspondence by both industry and government, the observations of early scientists, etc. The newly-emerged fields of climate history and environmental history have already developed a solid track record in ecological research related to agricultural fluctuations and changes in plant cover over time in other areas (particularly northwest Europe). Based on this success, it is likely that the same approaches could be applied to the acquisition of a historical understanding of coastal ecosystems in the Gulf of Alaska.

The proposed project would explore and evaluate the potential of these archaeological, ethnographic, and historical sources to provide answers to key questions about long-term ecosystem change and stability in the region, that would in turn provide the understanding necessary to determining what current changes in the environment are either directly or indirectly attributable to the oil spill. If the findings demonstrate that this potential can be realized in a timely manner through reasonable outlays of funds and effort, then follow-up research programs to compile and analyze the data could be developed and implemented in subsequent years.

PROJECT DESIGN

A. Objectives

The purpose of the project is to provide professional evaluations of archaeological, ethnographic, and historical data as sources for understanding long-term ecosystem dynamics in the area of the *Exxon Valdez* oil spill. These assessments will help biological scientists and the Trustees decide whether or not the future acquisition and analysis of such data would have utility in discriminating between injured species recovery problems that are linked to the oil spill and those that are associated with natural fluctuations in natural systems. Separate evaluative reports, specifically designed for a biological scientist audience, would be produced for each of the three data sources.

B. Methods

In the case of the archaeological and historical assessments the studies would be limited to library research. First, the principal investigators would review the existing literature relevant to the topic of inquiry. Second, on the basis of this review, they would evaluate the specific potential of their discipline to address questions of interest to biological scientists that are attempting to add time depth to their descriptions and explanations of ecosystem operation and understand factors that influence the relative success of select component species (i.e., harbor seals, herring) over time (100+ years). Third, if the evaluations clearly demonstrate that significant contributions can be made through programs of reasonable and practical future research, the investigators will outline, recommend, and prioritize the lines of inquiry that are considered to be the most productive from the stand point of cost/benefits.

For the most part, the ethnographic assessment will follow the same basic steps and emphasize literature review and evaluation. However, because ethnographic research demands the active participation and cooperation of the Native Alaskan communities that will assist any future research as collaborative researchers, close consultation with Native communities in the area of the *Exxon Valdez* oil spill will be required. Contact with members of these communities will also be required to ascertain the level and kind of traditional knowledge that exists today. A large number of the Native elders that were keepers of traditional knowledge about the local environment only a few years ago have since passed away or have acquired health problems that could preclude their participation in collaborative research.

The draft reports that are generated by these inquiries would not only be subject to standard peer review, they would also be distributed to key biological scientists engaged in ecosystem and injured species research for their review. Finally, the participating researchers in the three fields would review each others' products. The final reports would incorporate appropriate recommendations and corrections that emerged in the course of the review process.

C. Schedule

8/94 Preparation of Research Plans/Scopes of Work

10/94	Start of Work Under Plan
Winter 95	Consultation With EVOS Scientists
8/95	Draft Reports Submitted
8/-10/95	Review of Draft Reports
1/96	Final Reports Submitted
3/96	Printing of Final Reports

No fieldwork is required for the archeological and historical assessments. Consultation with Native groups and communities, however, will be an ongoing process that will be designed into the ethnographic evaluation.

D. Technical Support

Other than printing and minor archiving of data, no special technical support to the research will be needed.

E. Location

The work will largely take place in an office setting with occasional travel to archives, libraries, and workshops. The ethnographic research will differ somewhat in that several trips to Native Alaskan communities will be required to consult with elders holding traditional knowledge.

PROJECT IMPLEMENTATION

The National Park Service has assumed a lead role for this project to assure that there is an agency sponsor for the work. However, the National Park Service has no proprietary interest in the project. We invite the involvement of other Federal agencies and the state if they wish to participate and assume responsibility for one or more components of the work. In fact, the National Park Service would be more than willing to transfer its project lead role to another agency as long as there was strong assurance that the research would not significantly deviate from what is proposed here and that it be done well.

In this project, the work of the lead agency would be limited to project design, administration, and technical oversight. The actual research would be carried out by scholars with a demonstrated background in environmentally-oriented research within their respective disciplines. The services of these scholars would be obtained by means of competitive contracts and/or cooperative agreements with recognized educational institutions.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The agency project manager will work closely with the Coordination Committee of the EVOS scientists and the EVOS Cultural Resource Working Group to insure that the work will properly address the need for archeological, ethnographic, and historical assessments of long-

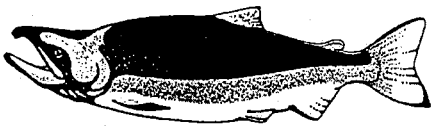
term ecosystem stability and change as outlined on page A-9 of the Draft Restoration Objectives and Strategies by Resource and Service. In addition, the principal investigators of the three studies will meet together at the winter EVOS science workshop, report on their progress to the assembled scientists and interested public, and seek corrective feedback on their work. The review of the EVOS scientists will also be sought for the draft reports. Finally, the principal investigator for the ethnographic study will develop appropriate and effective mechanisms for frequent consultation with the Native Alaskan communities in the oil spill area as well as collaborative researchers from these groups.

FY 95 BUDGET ($K)

Personnel	12.0
Travel	3.5
Contractual	138.0
Commodities	1.0
Equipment	0.0
Subtotal	154.5
Gen. Admin.	12.2
Total	166.7

DOC#9506160063

Project #95079



NERKA, Incorporated

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JUN 16 1994
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

A PROPOSAL TO THE *EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL

June 14, 1994

Pink Salmon Restoration through Small-Scale Hatchery Enhancement.

Principal Investigator: Jack M. Van Hyning, Ph.D.

Organizations: NERKA INC. and AQUABIONICS INC.

Suggested Funding:	FY 1995	$150,000
	96	75,000
	97	50,000
	98	50,000
	99	50,000
	2000	50,000

Start-up and Completion Dates: October 1, 1994 - December 31, 2000.

Duration: 6 years, 4 pink salmon cycles.

Area: South Bay, Perry Island, Prince William Sound.

Contact: Jack M. Van Hyning
PO Box 80165
Fairbanks, Alaska 99708
(907) 479-2476

INTRODUCTION

Pink salmon in Prince William Sound are considered an injured resource which is not recovering. We propose to utilize our aquaculture operation and expertise at South Bay, Perry Island to enhance and increase the local pink salmon runs.

In addition to a large shellfish farm at this site (Aquabionics Inc.), we have a permit for a non-profit salmon hatchery (Nerka Inc., ADFG PNP Permit No. 1). A small hatchery operated during the late 1970's and early 1980's, but has been inactive for a number of years because of financial and personnel issues which have been resolved. In addition to the direct contribution of additional salmon to the fishery and escapement, we will monitor the environment and return of fish and contribute to an understanding of the factors that influence the productivity of the pink salmon stocks. There have been concerns expressed about the very large salmon hatcheries depressing the natural runs through competition, genetic mixing, overharvesting, etc. We propose to supplement the wild runs, without overwhelming them, and study the effects of incrementally increasing production.

NEED FOR THE PROJECT

The pink salmon resource was apparently injured by the oil spill and is showing little or no signs of recovery. There is thus the need for both direct additional recruitment of juveniles into a healthy ecosystem and an understanding of the dynamics of the system. We propose to contribute to both these needs.

PROJECT DESIGN

Objectives (Tasks):

1. To produce 10 million pink salmon fry by 1999 in a small, environmentally compatible hatchery.

2. To understand the ecosystem into which the pink salmon are introduced and the factors controlling population return of both wild and hatchery fish.

Methods:

Due to the short time frame available for preparation of this proposal, only a conceptual methodology is presented. Complete details can be presented later if the Council finds the concept of interest.

Each returning run will be carefully enumerated. The spawning areas are small and a complete count can be made by boat and on foot. Some fish will be collected for hatchery incubation. Lambert Lagoon and South Bay will be regarded as a study ecosystem and environmental data will be gathered on water temperature, salinity, turbidity, zooplankton abundance, predators, etc. The company trawler "New Wave" will trawl for predator fishes for several days each spring and skiffs and an anchored barge will be utilized for sampling and data collection. A proportion of the hatchery-raised fingerlings will be coded-wire tagged, or otherwise identified, for later identification.

Schedule:

The 1994 escapement of pink salmon will be enumerated during August-September, prior to contract funding. Project planning will begin during the fall and winter of 1994-95 as well as the procurement of equipment and permits. The ADFG salmon hatchery permit is still valid, but permits for salmon hatchery operation from the U.S. Forest Service and Alaska Department of Natural Resources have expired and will need to be reapplied for.

Environmental monitoring will begin during March 1995 and continue through the contract period with emphasis on the spring and summer. Pinks are the only salmon spawning in the area and most are inter-tidal spawners. It is not possible to obtain any measure of downstream migration, but sampling of fry in the lagoon and bay for growth and survival will continue until they leave the area. Fry produced by the hatchery will be counted and sampled before release. Potential predators and competitors will also be sampled during the spring. Each summer's escapement will be counted during August and September and some eggs taken for
incubation. Data analysis will be conducted during the winter and a progress report submitted annually; a final report at the end of the contract.

Technical Support:

In addition to the Principal Investigator, the following will participate:
Dr. Steven Smith, biometrician with the University of Washington Center for Quantitative Studies in Fisheries, will be consulted for statistical analysis and computer programming.
Mr. Jeff Hetrick, manager of the Moose Pass Hatchery near Seward, will provide advice on hatchery design and operation.
Mr. Jon N. Van Hyning, a Prince William Sound commercial fishermen, will assist is sampling gear development, operation and maintenance.
Mr. Nate Hopkins, caretaker of the aquatic farm, with a few hired employees, will do the routine data collection and hatchery management.

Location:

All work except analysis and report preparation will be done at Perry Island, 25 miles southeast of Whittier. All fishermen and communities that are dependent on the pink salmon fishery, will benefit from the project. The outer areas of southern Perry Island had extensive oil deposition, but no oil penetrated into Lambert Lagoon, where the salmon spawning stream are located.

PROJECT IMPLEMENTATION

The project should be done by Nerka Incorporated, a private non-profit salmon hatchery corporation, and Aquabionics Incorporated, an Alaskan consulting and sea food company specializing in shrimp fishing and oyster farming.

COORDINATION

This project will be fully coordinated with other related projects conducted by the University of Alaska, Alaska Department of Fish & Game, National Marine Fisheries Service, and the Forest Service.

PUBLIC PROCESS

No specific plans have been made, but the Principal Investigator will participate in any desired forum.

PERSONNEL QUALIFICATIONS

Jack M. Van Hyning will be Principal Investigator. He has B.S., M.S. and Ph.D. degrees in fisheries from the University of Washington, University of Miami, and Oregon State University, respectively, with 40 years experience in fisheries research and management with a specialty in salmonid population ecology. He was Marine Research Supervisor for the Oregon Fisheries Department, Associate Professor of Fisheries at the University of Alaska Fairbanks, and a private consultant and fish farmer. He is familiar with hatchery programs in Oregon and Prince William Sound and is finishing a study on the factors affecting the return of chum salmon to Norton Sound. He has been invited to present the findings at an Arctic Science Conference in Anchorage and Vladivostok, Russia.

Dr. Steven Smith has undergraduate degrees in statistics from Utah State University and a Ph.D. from the University of Washington in biomathematics. He worked with Dr. Van Hyning on Norton Sound chum salmon and is heavily involved with the Columbia River salmon problem.

Jon Van Hyning has as an Associate Degree in Fisheries Technology and has been a commercial fisherman in Prince William Sound for 10 years, including the development of a new deep-water shrimp fishery.

BUDGET

Because of time constraints, the funding presented on the cover page is a very preliminary estimate. If the proposal is viewed with favor, we will submit a carefully drafted, realistic budget for further review. The 1995 budget covers the construction of a small, research hatchery. After that initial expense, annual expenses for time, travel, administration, etc. should be between $50,000 and $75,000. By the end of the contract period the project should be self-supporting in providing a continuing source of supplemental salmon to the fisheries of the Sound and an increased understanding of the possible benefits of small project salmon enhancement.

Project # 95080

DOC.#9506160701 A

RECREATION RESTORATION PROJECT PROPOSAL

PROJECT NAME: Fleming Spit Recreation Area Enhancements

SPONSOR: The Cordova Sporting Club

PROJECT DESCRIPTION: Fleming Spit is located within the Cordova City limits and is within the Prince William Sound Recreation Project area. Fleming Spit is already the site of a strong terminal Coho sport fishery and in the last 4 years a fledgling King fishery has been started. The area is popular and accessible. The Cordova Sporting Club, a non-profit organization dedicated to the promotion and development of outdoor opportunities in the Cordova area, along with many other interested local agencies and groups, would propose a project funded by the Exxon Valdez Oil Spill (EVOS) civil settlement monies to improve the Fleming Spit site for added recreational use, safer access, and an improved and enlarged fishing area.

The ongoing recreational fisheries at Fleming Spit have been developed through the cooperation of the Sporting Club (CSC), the Alaska Department of Fish and Game (ADF&G), and Prince William Sound Aquaculture Corporation. The smolt release areas and the surrounding tidelands and beach areas where the fish return to, however, need to be enhanced and upgraded to handle the ever increasing pressure from local recreational fishermen as well as a growing number of tourists. Our proposal includes acquision of critical lands and tidelands in the immediate Fleming Spit area, a dredge and fill project to improve the existing smolt release ponds, a general clean-up of the area including the removal of a derelict barge, and the addition of a variety of recreational facilities.

Our proposal is broken down into two phases. Phase I focuses upon work that is directly related to enhancing the sport fishery in the area. Phase II includes projects and facilities that take advantage of other recreational opportunities that exist in the area such as camping. Our specific proposal including work tasks, facilities, and projected costs follows:

Phase I:

Project/Task	Projected Cost
Acquire Parcel	$150,000
Dredge and Fill Operations/ (including engineering and permitting)	$150,000
Flood Plain Management (engineering)	$50,000
Surveying	$30,000
Barge Removal	$10,000
Composting Toilet Facilities	$30,000
Fishing Boardwalk (1,000 feet, 8 feet wide parallel to road with ramps and stairways.)	$300,000
Fish Cleaning Stations (two stations, 6 bays each)	$10,000
Off Street Parking (signs, curb stops, paving)	$20,000
Permanent Net Pens	$20,000
Total Cost/Phase I	$770,000

Phase II:

R.V. Campground (10-15 Units, electrical hookups, tables, fire pits)	$100,000
Sewerline Extension and R.V. Dumpstation	$450,000
Tent Platforms	$20,000
Covered Picnic Pavileon	$25,000
Total Cost/Phase II	$595,000
Total Cost/Project	**$1,365,000.00**

We would anticipate that the total project would take 2 to 3 years to complete. A preliminary site plan depicting the approximate location of all proposed facilities is attached.

POTENTIAL CONFLICTS: We do not anticipate any significant or major conflicts. Fleming Spit and the recreational fishery there are enjoyed by local Cordovans and visitors alike from early spring through the Silver season in the fall. The Cordova Chamber of Commerce holds a Silver Salmon derby each fall and many people fish the area during that time. The Chamber has been a strong supporter of recreational development at the spit for years. Groups such as the Cordova Fly Fishers and the Cordova Trap and Gun Club support our recreational goals for the area as well.

This proposal also enjoys the support of other important local agencies and organizations. For example, the Alaska Department of Fish and Game has been a long time supporter. ADF&G has proposed a demonstration hatchery at the site in the past and it started the salmon release program there. The Sport Fish Division is a strong supporter and has indicated that it would provide matching funds for this project. Prince William Sound Aquaculture has expended its own monies over the past few years to keep the Silver and King fisheries going. It has also submitted a proposal to improve the rearing ponds to insure a better smolt survival rate.

The Division of Parks and Outdoor Recreation has considered Fleming Spit as a possible addition to the State Park System. Development at Fleming Spit is currently listed as a priority in the Department's Statewide Recreation Plan. The U.S. Forest Service has also demonstrated its support. Its staff have helped in the development of this proposal. Finally, this project has the strong support of the City of Cordova. It appears as a goal in the City's Overall Economic Development Plan. The City has developed plans and sought funding for this type of project since 1985. The land is already zoned for conservation and recreational uses by the Cordova Coastal Managment Plan. We have a willing seller for the land we want to acquire.

There are two potential conflicts which will need to be worked out however, we believe they are easily resolved. First, the Eyak Corporation has leased adjacent tidelands from the state for use as a log transfer facility. The leased area is a very large tract which extends into the fishing area. This area is not needed for the transport of logs and the actual facility is a good distance from where people fish. We believe we can work out an acceptable arrangement. Log trucks moving through the area pose a potential threat to pedestrians however, traffic control signs should be sufficient to mitigate that problem.

Second, there are often transient workers and other visitors who illegally camp on private lands and State owned tidelands in the

area during the summer. We don't see this as a conflict because this project will enhance their camping experience by providing good clean places to camp complete with restroom facilities, dump stations, water, trash cans, and the like.

LINK TO EVOS INJURY: Since the oil spill in March, 1989, Prince William Sound commercial fisheries have declined drastically. A large majority of Cordova residents are involved in the fishing industry and because of the poor commercial seasons these residents have had increased free time and an increased need for sport caught fish. More and more of them have used the Fleming Spit area. The continued emotional impacts from the spill have also increased the need for recreational outlets and positive relationships with fishing for the people adversely affected. People have appeared to be hesitant and concerned about sport fishing in the oiled areas of the Sound and more and more of them have expressed an interest in and support for the enhanced fishery at Fleming Spit.

With the spill and the resultant media coverage, Prince William Sound has become an increasingly well known tourist destination. This is good for Cordova; with the decline in fishing since the spill, we need to concentrate on diversifying our economy. This area is an excellent location for facilities of this type because it is within walking distance of downtown and approximately 3,000 feet from the new Cordova Ferry Staging Area.

But there are also problems associated with the increase in visitors. These people need to have safe and accessible activities in the immediate area. Our desire would be to channel tourists to areas like Fleming Spit and relieve the recreational and fishing pressures on other fresh water spawning streams in the Copper River Delta area.

ECONOMIC FEASIBILITY: The enhancement of the Fleming Spit area and the recreational fishery would benefit an unlimited number of Cordova residents and visitors to Prince William Sound. The principal costs would be in land acquision and infrastructure inprovements. Maintenance of the facility/park could be financed through user fees on the campsites and the dump station, and user donations. As stated above, the City of Cordova, The Alaska Department of Fish and Game, the Division of Parks and Outdoor Recreation, the U.S. Forest Service, and Prince William Sound Aquaculture Corporation have all discussed and proposed enhancement projects for this area in the past. Following acquision of the land and construction of the facilities, the area could be turned over to one of these agencies. They would subsequesntly be responsible for the maintenance and upkeep of the improvements. PWSAC has been instrumental in obtaining the Coho and Chinook smolt and we see no reason why this won't continue.

CONSISTENCY WITH SURROUNDINGS: Fleming Spit is located on the edge of town directly on Orca Inlet. Because of the past efforts at

establishing the terminal Coho and Chinook runs, it has become a well known and heavily used "fishing hole". The area is accessible when weather prohibits boating and for those who don't have access to a boat suitable for the Inlet or one of the surrounding rivers or streams. Our project will increase the accessibility, the safety, and the appearance of the area. The existing smolt pond will be enlarged and improved to decrease the mortality rate among young salmon. The land is zoned for conservation and a recreation area is consistent with that designation.

NUMBER OF PEOPLE BENEFITTING: No established facilities are presently in place so accurate user counts are not available. However, it can be said that the improvement of the Fleming Spit area would benefit the entire population of Cordova. In addition, people using other parts of the Sound for recreation would be drawn to the enhanced fishery much as they are to the fisheries adjacent to the hatchery in Valdez. The Cordova Silver Salmon derby held in late August and easly September draws more and more entrants each year. The proposed improvements at Fleming Spit would allow more and more people access to the fish and would result in an expanded tourism industry for Cordova.

DISPLACEMENT OF CURRENT USERS: The only people being displaced would be transient campers who camp on private land and State owned tidelands during the summer months. These people would not really be displaced but rather, would be provided with a legitimate and significantly improved place to camp.

ADJACENT LAND MANAGEMENT: The tidelands immediately north of Fleming Spit are leased by the Eyak Corporation and used as a log transfer facility. We do not believe this presents a conflict with this project. Other surrounding tidelands are owned by the State of Alaska and the City of Cordova. Some of the uplands have private owners (including the parcel we hope to acquire). We would have to be sure that private landowners have legal access to their property. The rest of the uplands are owned by the State and the City. The area is zoned for Conservation; however, recreation projects are specifically permitted.

INFLUENCE ON OTHER PROJECTS: As stated above, the enhancement of the Fleming Spit area for recreation and sport fishing has been proposed and discussed by a number of agencies and other organizations over the years. Because legislation or budget allocations were not forthcoming, none of these proposals have come to fruition. No other use has been publically discussed for this area. All of the groups and agencies identified above would cooperate on the improvements proposed for Fleming Spit. It would be a community improvement and a project that everyone in Cordova could appreciate and use.

DOC. #9506160 70 B

Project # 95082

RECREATION RESTORATION PROJECT PROPOSAL

PROJECT NAME: "Mor-Pac Hill" Campground Improvements

SPONSOR: The City of Cordova

PROJECT DESCRIPTION: Mor-Pac Hill is located directly across Railroad Avenue from the old Mor-Pac fish processing plant. It is less than a mile from downtown Cordova and a very short walk from the Cordova ferry dock. The Mor-Pac complex is under new ownership and is now known as Cannery Row Inc. Cannery Row Inc. owns the property that the campground is located on.

The existing campground contains 15 to 20 good campsites for tent campers. The site is located on a nine acre parcel and therefore, has the potential for a number of additional camp sites. The campground was constructed during the summer of 1989 as a direct result of the Exxon Valdez oil spill. During that period, the City was inundated with clean-up workers, people seeking work on the clean-up, and various other visitors. The City had no legitimate campground at that time and this one was quickly constructed under emergency conditions. The construction of this campground was a cooperative effort by the Chugach Alaska Corporation, owners of the Mor-Pac plant at that time, and the City of Cordova. Chugach provided the land and the City constructed a waterline and other basic improvements.

Since that time, the campground has fallen into disrepair. No one is currently responsible for managing and caretaking the area. The new owners do not have the resources nor the time to operate a campground and have posted no trespassing signs on the property. Campers have still been using it however, and this has resulted in periodic problems with litter, garbage, violence, trespass, and vandalism. The City is experiencing an increase in visitors every year and it still does not have a good tent campground. We desperately need to develop these types of facilities. This campground provides us with an opportunity to enhance an already existing facility.

This area has great potential because it already has 15 to 20 excellent camping sites, the potential for more sites, and an excellent location. It is less than a mile from both downtown Cordova and the Fleming Spit Recreation area. It is soon to be connected to downtown by a new bike trail. It is a very short walk from the Cordova ferry dock and it is close to trails that lead or will lead into the proposed Mt. Eyak State Park.

We propose to use EVOS recreation restoration funds to improve this campground so that it will be a safe and enjoyable experience for

tent campers. We would begin by purchasing the parcel from the owners who have expressed a willingness to sell. The improvements we envision include chain link fencing to improve safety and protect other unrelated facilities, a bathroom and shower facility, a short sewer line, and various site improvements such as gravel and tent platforms. Following is a projected budget for this project:

Projected Budget:

Facility/Work Task	Estimated Cost
Land Acquision	$150,000
Surveying	$20,000
Bathroom Facility (with showers)	$100,000
Sewer Line (300 ft.)	$40,000
Chain link Fence (8 ft. high, 400 ft. Installed)	$20,000
Tent Platforms	$20,000
Gravel, Wood misc. materials	$10,000
Total Project Cost	**$360,000**

POTENTIAL CONFLICTS: The current owners of the property have closed the campground and posted no trespassing signs. People still camp there without permission. The owners have indicated a willingness to sell this property and have stated that they believe a campground is a good use for the site. We propose to eliminate existing conflicts by giving campers a safe and clean place to camp.

There are no other conflicts with existing uses or adjacent landowners that we are aware of. The area is surrounded by woods and we believe that a campground is an appropriate use of the parcel.

LINK TO EVOS INJURY: There are two specific links to injuries suffered as a result of the oil spill. First, this campground was originally built in response to the influx of clean-up workers and job seekers. The City was overwhelmed by this in-migration and was unable to provide the services necessary to accomodate these people. As a result, the City was forced to build this campground under emergency conditions.

Second, the oil spill has created a heightened awareness about Prince William Sound in general and Cordova in particular. People have become increasingly aware that 1) Cordova suffered and continues to suffer great econonic and emotional damage due to the spill and 2) that there are outstanding recreational opportunities in and around Cordova (especially since this area of the Sound was

not oiled). The result is a marked increase in the number of visitors coming to this community. The City still does not have the capability to acomodate these visitors; especially those who want to travel by tent and backpack.

ECONOMIC FEASIBILITY: This project will not require any subsequent or incremental funding by the EVOS Trustees. After the campground is improved, it will be managed by the City of Cordova in a way that will make it self supporting. User fees will be implemented to pay for maintenance and upkeep.

CONSISTENCY WITH SURROUNDINGS: As noted above, we believe a campground is consistent with the character of the area. The campground is surrounded by forest for the most part. There are no residential areas close by. The nearest facilities are the Cannery Row complex and the Cordova Electric Copperative power plant. Both are far enough away from the campsites that we do not expect any adverse impacts or conflicts.

NUMBER OF PEOPLE BENEFITTING: There is only one legal place to pitch a tent within the City Limits at this time. We believe this campground would be used to capacity during the summer months. We estimate that this could translate into approximately 4,800 camper days. (20 sites, 2 people each, 120 day camping season).

It could also be argued that this facility would benefit the entire community. Since campground space is extremely limited in Cordova, campers are forced to camp wherever they can find a suitable piece of woods. This has resulted in a variety of problems for the community including trespassing, litter, sanitation problems, and violence. This effects everyone and the City would be better able to control these problems by directing campers into a safe and well equiped campground.

DISPLACEMENT OF CURRENT USERS: There would be no displacement of current users. The only people using the property now are campers who are camping there illegally. We propose to resolve this problem by providing these people with a legal and convenient place to camp.

ADJACENT LAND MANAGEMENT: Lands immediately to the North and South of this parcel are privately owned. They are undeveloped at present and are unlikely to be developed in any intensive way because of the extremely steep topography. The parcel is bounded by Railroad Ave. and the Cannery Row Complex to the east and by City and State land to the west.

INFLUENCE ON OTHER PROJECTS: This project will not have any influence upon any other projects that we are aware of. There are no other intended uses for this property.

DOC. # 9506160 70 C

Project # 95084

RECREATION RESTORATION PROJECT PROPOSAL

PROJECT NAME: Odiak Camper Park Expansion

SPONSOR: The City of Cordova

PROJECT DESCRIPTION: Odiak Camper Park is located on Whitshed Road immediately adjacent to Orca Inlet. It is approximately one mile from the Center of Cordova. The camper park currently has 18 RV sites. All of the sites have electricity and water is available at six locations through hose bib type hydrants. A sewerage dump station is provided for R.V.s equiped with holding tanks. A shower/restroom facility is located in the middle of the campground for use by both R.V. campers and the few tent campers who use the area. While the camper park provides camping space with the basic utilities for up to 18 vehicles, it is badly in need of expansion and upgrading in order to meet an increasing demand.

The current facilities are marginal at best. The single restroom/shower facility is being used to its full capacity. Lines of R.V's waiting to dump holding tanks frequently form at the septic dump station; the only legal dump site in Cordova. Campers have to haul water from hydrants to their sites, a situation which is not always sanitary and certainly not convenient. Finally, the campground, in its current condition, is not aesthetically appealing to many campers. Landscaping is desperately needed so that we can take advantage of an otherwise ideal location for a campground.

Odiak Camper Park is currently the only legitimate camper park in Cordova. We are experiencing increases in the number of visitors each year and the demand for camping space has increased porportionately. Therefore, the need for expansion and basic improvements at the park are warranted. We propose to expand the park by an additional 40 R.V. spaces and to add basic utilities to each site. We also invision adding playground areas, additional tent sites, and landscaping. A proposed budget follows:

Work Task/Improvement	Estimated Cost
Water and Sewer line extensions to 40 spaces including fire hydrants	$140,000
Landscaping including materials and Labor	$30,000
Electrical Hookups to 40 new sites, trenches to be shared with T.V. and Tel.	$76,000

Tent Platforms	$10,000
Picnic Tables/Fire Grates	$10,000
TOTAL PROJECTED BUDGET:	$266,000.00

POTENTIAL CONFLICTS: The only potential conflict which exists is that the campground is located a short distance from the municipal landfill. We proposed to address the conflict be adding fencing and trees which will serve to mitigate the visual impacts. The landfill will be closed in 3-5 years and it has been suggested that that area could also be used for campground expansions.

LINK TO EVOS INJURY: The oil spill has created a heightened awareness about Prince William Sound in general and Cordova in particular. People have become increasingly aware that 1) Cordova suffered and continues to suffer great economic and emotional damage due to the spill and 2) that there are outstanding recreational opportunities in and around Cordova (especially since this area of the Sound was not oiled). The result is a marked increase in the number of visitors to this community. The City does not have the capability to adequately handle the increased demand for camping facilities. Improvements to this already existing campground would increase the City's ability to provide this service.

ECONOMIC FEASIBILITY: This project will not require any subsequest or incremental funding by the EVOS Trustees. After the campground is improved, it will be managed by the City in a way that will make it self supporting. The park is currently self supporting and is operated as an enterprise fund.

CONSISTENCY WITH SURROUNDINGS: The site is already used as a campground. It is surrounded on the North and East by water and on the south by woods. The landfill is located to the west. We believe campground expansion is consistent with the immediate surroundings.

NUMBER OF PEOPLE BENEFITTING: The City is desperately in need of campground facilities. This expansion and upgrade will provide suitable space for 58 R.V. campers and 10-15 tent campers.

It could also be argued that this facility would benefit the entire community. Since campground space is extremely limited in Cordova, campers are forced to park their R.V.s anywhere they can find space. This has resulted in a variety of problems for the community including trespassing, litter, sanitation problems, and blockage of public roads and alleys. The problem was so bad, particularly during the oil spill clean-up, that the City Council was forced to pass a trailer ordinance which strictly limited where motor homes could park. This forced many visitors outside of the City limits; a situation which is not good for either public relations or the local economy.

95084

DISPLACEMENT OF CURRENT USERS: There would be no displacement of current users. There are no users of this parcel other than campers. The City uses the expansion area for equipment storage.

ADJACENT LAND MANAGEMENT: All adjacent land and tidelands are owned by either the City of Cordova or the State of Alaska.

INFLUENCE ON OTHER PROJECTS: There are no other projects planned or in progress in the immediate area.

DOC.# 9506160 70 D

Project #95085

RECREATION RESTORATION PROJECT PROPOSAL

PROJECT NAME: Cordova Historical Marine Park

SPONSOR: The Cordova Planning and Harbor Commissions

PROJECT DESCRIPTION: The goal of this project is to acquire, restore and display vintage fishing vessels, which have been built and/or used by the Cordova fishing fleet during previous decades for commercial or subsistence harvest. Specific boats or boat types which have played an important part in Cordova's maritime and fishing history would be placed on display with interpretive signs describing what role the vessel played in Cordova's history, as well as design origins and how and where it was operated.

A potential site has been discussed by the City Planning, Harbor and Historical Commissions and found to be quite appropriate. In the plan for the new ferry terminal, there are several undesignated narrow strips of land surrounding the parking area. These open areas would be ideal for staging a variety of the historical vessels, offering maximum exposure and visibility to visitors, as well as local residents.

Six types of vessels have been identified as appropriate for the exhibit: (Specific boats that are available for those indicated *)

Charley Moore 24'*	Double Ender*
Tiedeman 22'	Plank Skiff
Cannery Boat (Seiner Style)*	Seine Skiff

It is anticipated that several of the vessels would be staged in a manner to allow boarding for closer observation, making this a "hands-on" exhibit.

It would be an outdoor museum, offering many benefits, such as:
- -the preservation of vessels otherwise soon to be lost
- -the actual lifesize examples displaying the development of the local fisheries
- -an educational presentation for future generations of residents and visitors
- -an attractive and interesting addition to Cordova's Ferry Terminal area, as well as great photo opportunities for tourists

PROJECT CURRENT STATUS

LAND to be donated by	City of Cordova	20,000.00
Vintage boat	City of Cordova	623.85
ansport of boats	Voluntary Equiment & labor	687.89
estoration of Vessels	voluntary labor	3,600.00
Vintage Equiment donated		15,800.00
	Total Donations to date	40,711.74

95085

Projected Budget:

	Estimated Cost
Acquisition and Transport of Vessels	$35,000
Restoration to visual working condition (cosmetic repair, re-surfacing & painting)	
Charley Moore 24'	$ 5,000
Tiedeman 22'	$ 5,000
Cannery Boat (Seine Style)	$20,000
Double Ender	$ 9,000
Plank Skiff	$ 2,000
Seine Skiff	$ 3,500
Outfit with authentic or representational equipment	
Charley Moore 24'	$ 3,500
Tiedeman 22'	$ 3,500
Cannery Boat	$10,000
Double Ender	$ 5,000
Plank Skiff	$ 3,000
Seine Skiff	$ 3,000
Signs	
Overview of the historical diversity of the local fisheries (examples of shellfish, crab, salmon, herring, kelp)	$ 6,000
Vessel information delineating the era, usage, builders & operation	$18,000
Pavilions for Charley Moore, Tiedeman & Double Ender	$45,000
'Seascaping' and landscaping, finger docks, boarding gangways, lighting, various surrounding surface treatments.	$20,000
TOTAL PROJECT COST	$196,500

POTENTIAL CONFLICTS: There are no conflicts with land usage, the future staging area will largely be created by introducing fill into a current tidal zone. Other types of landscaping for visual aesthetics, or to create wind and weather breaks will be impossible with vegetation.

There is no better use for these vessels, which have become virtually obsolete. Subsequent maintenance and visitor safety issues will have to be addressed by a joint effort of the D.O.T., the City of Cordova and local non-profit organizations promoting tourism, however, no serious impediment is foreseen.

95085

LINK TO EVOS INJURY: There are many links to injury resulting from the oil spill. Demand for response vessels for the cleanup attracted boats from both local and distant fisheries, including from out of state. The high dollar contracts affected boat values in two specific ways. A large number of fishermen used their capital gains to invest in newer, more modern hulls, which devalued the previous average gillnetter or seiner. In addition, once the contracts were completed, many of the relocated vessels were 'dumped' onto the local market further reducing the value of older local vessels. Consequently, the less competitive vessels have little value, while the older models have become useless to the present fishery.

In a recent article about Cordova in the Anchorage Daily news, it noted **"More than any other town in South Central Alaska, Cordova's fortune has been tied to the sea. As long as the fishing was strong, Cordova did just fine."** After three disastrous fishing seasons, diversifying Cordova's economy has become a primary concern for the community. It has long been recognized that tourism offers a sustainable growth industry for the State of Alaska and has great potential in Cordova.

Public awareness of the Prince William Sound has increased dramatically since the oil spill, national news, printed coverage of many varieties, even movies, have drawn significant attention to Cordova. This awareness has stimulated curiosity and has attracted travellers visiting the State, as well as Alaska residents to Cordova, and will no doubt continue to do so. Much of the history of our City can be preserved by saving these vessels, to entertain and instruct those interested in the early days and to the recent changes in our fishing industry.

ECONOMIC FEASIBILITY: This project is a one-time request to help establish a permanent physical historical representation of Cordova's fishing fleet with examples from the claming and canning days, up to early gillnetting and seining. Once completed, maintenance and management should be nominal and could be overseen by local groups in conjunction with D.O.T.

CONSISTENCY WITH SURROUNDINGS: As seen on the plans, included, the vessels will blend in very appropriately with Cordova's new Marine Highway Terminal. Being adjacent to the City's haul-out yard, this area in general has been used to store many vessels of this nature for layup for years. With this proposal, there is an opportunity to make these vessels available and safe for public study.

95085

NUMBER OF PEOPLE BENEFITTING: The community as a whole will benefit. Newcomers will be able to understand the transitions experienced by the local industry and 'old-timers' will be able to reminisce and share their history with friends and visitors. Everyone waiting for the ferry will have an interesting variety of scenes to explore and appreciate.

DISPLACEMENT OF CURRENT USERS: There is no displacement, these strips are on the perimeter of the new parking area for the ferry terminal and are as yet undesignated.

ADJACENT LAND MANAGEMENT: As shown on the plan, the adjoining property is owned on one side by the City for a staging area and by the State Ferry System on the other.

INFLUENCE ON OTHER PROJECTS: This project will have only positive affects on all of the present and future recreational facilities in the area and can only enhance any other types of development in the area.

Population and Community Dynamics of Eelgrass and Associated Fauna

Project Number:	95086B
Restoration Category:	Research
Proposed By:	University of Alaska Fairbanks
Lead Trustee Agency:	ADFG
Cost FY 95:	$78,300
Cost FY 96:	$128,200
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Herring Bay, Prince William Sound
Injured Resource/Service:	Intertidal organisms

INTRODUCTION

Resources within eelgrass beds have clearly been injured by the *Exxon Valdez* oil spill. A reduction in eelgrass density, a reduction in the densities of associated sea stars (*Dermasterias)* and crabs (*Telmessus*), an increase in the density of mussels that live attached to eelgrass (*Musculus*), and an increase in juvenile cod were observed within oiled eelgrass beds. *Musculus* are at times very dense and may inhibit the growth and survival of eelgrass. The sea stars, crabs, and cod feed on the *Musculus*.

We suspect that recovery of eelgrass may be inhibited by their inability to quickly recolonize bare patches after injury, and that the recovery may be slowed by an increase in *Musculus* at oiled sites. Furthermore, *Musculus* densities may be higher at oiled sites because of a lack of predators (sea stars and crabs) at those sites.

This project examines factors that may inhibit the recovery of subtidal populations of eelgrass and invertebrates within the eelgrass community. This task would lead to the determination of the necessity for, and appropriate design of, restoration activities. This is a continuation of community dynamics studies within the coastal habitat.

NEED FOR THE PROJECT

This project would allow us to understand whether eelgrass resources should be restored, and if so, what methods may be appropriate for restoration.

PROJECT DESIGN

A. Objectives

1. Determine the recovery rates of damaged eelgrass populations, both by vegetative growth of rhizomes, and by seedlings.

2. Determine the importance of *Musculus* on the growth of eelgrass.

3. Determine factors that may be responsible for determining the distribution of *Musculus*.

4. Examine recruitment rates of sea stars and crabs and estimate their potential for recovery.

B. Methods

Experimental manipulations of eelgrass within Herring Bay will be conducted to determine the growth and recolonization rate of eelgrass. Experiments will evaluate the expansion rate of eelgrass into cleared patches along the edge of the bed, and to isolated patches of eelgrass transplanted just outside the bed. The growth rate of rhizomes will be documented. The growth of transplanted eelgrass rhizomes and shoots will be examined both in the presence and absence of *Musculus*.

Factors affecting the distribution of *Musculus* will be examined. The distribution of *Musculus* both within and among eelgrass beds in Herring Bay will be examined. Correlations between distribution of *Musculus* and physical factors will be examined in order to provide testable hypotheses regarding factors affecting *Musculus*. *Musculus* transplant experiments will be conducted to examine if the distribution of *Musculus* is limited by factors influencing recruitment or survival.

Manipulative experiments will be conducted to examine the relative impact of grazing by crabs, sea stars, and cod on *Musculus*.

We will also conduct sampling to determine the size distribution of sea stars and crabs within the eelgrass habitat, and to estimate the potential for recovery via recruitment.

C. Schedule

Experiments will be conducted during four cruises in 1995. A progress report will be submitted

in September of 1995 that summarizes field observations. A final report will be submitted in March 1996.

D. Technical Support

No technical support will be required.

E. Location

This project will be conducted within Herring Bay, Prince William Sound.

PROJECT IMPLEMENTATION

Principal investigators for this project have been conducting injury assessment studies in the shallow subtidal within Prince William Sound since 1989, and are submitting several proposals for continued monitoring and assessment of subtidal resources. The investigators involvement in other related projects makes them uniquely qualified to conduct cost effective studies on the interactions within the eelgrass community.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is to be conducted in concert with subtidal monitoring studies and with studies of population dynamics of intertidal populations within Herring Bay. The research platform used for this work will be shared with the team studying intertidal community dynamics within Herring Bay, and it is expected that information as well as logistical resources will be shared by these groups. For example, it is anticipated that an integrated subtidal and intertidal research effort will allow intertidal crews to examine the potential impacts of fish and crabs on populations within the lower intertidal during periods when these habitats are submerged.

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	66.5
Commodities	0.0
Equipment	0.0
Subtotal	72.7
Gen. Admin.	5.7
Total	78.3

Project # 95093 (revised)

I. EXXON VALDEZ OIL SPILL BRIEF PROJECT DESCRIPTION

Project Title:	Restoration of PWS Wild Stock Salmon Resources and Services: An Integrated Approach
Project Leader:	Howard Ferren, Special Projects Manager
Lead Agency:	AK. Dept. of Fish and Game (ADF&G)
Cost of Project	**FY95:** $1,690,331; **FY96** $1,704,434
Start/Completion:	January, 1995 - September, 1995
Project Duration:	0.75 yr.
Geographic Area:	Prince William Sound
Contact Person:	Howard Ferren, Special Projects Manager PWSAC, P.O. Box 1110, Cordova, AK 99574 (907) 424-7511

II. Introduction

Prince William Sound Aquaculture Corporation (PWSAC) is the regional association for salmon enhancement in the PWS area. The corporation is authorized (Section 1 ch 111 SLA 1974) for the purpose of "contributing to the rehabilitation of the state's depleted and depressed salmon fishery", and is responsible (AS 29.03.020) for "providing salmon enhancement services."

Due to the **Exxon Valdez Oil Spill (EVOS)**, wild stocks of salmon in PWS are recognized as injured. Pink salmon in particular are identified as injured and not recovering (**EVOS** Trustee Council). As a result of these injured resources, individuals and communities of PWS have suffered lost or reduced services.

The purpose of this project is to rehabilitate injured wild salmon stocks and restore services to subsistence, commercial, recreational and other users and communities of the PWS area. This will be accomplished by an integration of collaborative professional and local resident partners, and integration of objectives to actively rehabilitate injured stocks; relocate hatchery production to locations which will reduce harvest pressures on injured wild stocks; research and develop stock baseline genetic databases; determine stream escapements, and monitor both gene pools and returning adults.

This project will result in stock identification, enumeration, rehabilitation, monitoring, development and use of local expertise and evolvement in the restoration and monitoring process, and utilization of the restored and replacement resources.

This project will contribute to the **EVOS Trustee Council** mission to "efficiently restore the environment injured by the *Exxon Valdez* oil spill to a healthy, productive 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 natural recovery, resource and service restoration and enhancement, replacement of resources, research and monitoring. The project falls under **EVOS** TC Draft Guiding Principles including:

- "occur within the spill area";
- "support services necessary for the people who live in the area";
- include "meaningful public participation process";
- reflect "a reasonable balance between costs and benefits";
- provide a "cost-sharing opportunity";
- "have a sufficient relationship to an injured resource"; and,
- "state a clear, measurable and achievable endpoint".

III. Need for Project

Restoration funds must be used "...for the purposes of restoring, replacing, enhancing or acquiring the equivalent of natural resources injured as a result of the oil spill or the reduced or lost services provided by such resources". This project is needed to: restore and replace injured resources by increasing the rate and degree of recovery of wild pink salmon stocks; and, to restore/replace injured or lost services by wild stock enhancement and relocation of hatchery stocks which have "sufficient relationship to the injured resource...and will benefit the same user group(s) that was (were) injured."

IV. Objectives

A. Restore wild stock salmon resources and services in PWS to pre-spill conditions.

B. Maximize fitness (both biologic and economic) of injured wild stocks through application of knowledge of salmon population biology, genetics and disease.

C. Reduce harvest of injured wild stocks by more specific management of wild and hatchery stocks.

D. Develop, integrate and coordinate collaborative participants in research, restoration and monitoring.

E. Develop, train and use resident expertise to establish the capability for continuing conservation and protection of PWS salmon resources.

V. Methods

Four methods will be used to accomplish the immediate objectives of salmon stock restoration; a fifth will serve the longer-term objective of establishing expertise to practice sustained efforts in stock restoration. The restoration methods include direct restoration through use of available fish cultural facilities and talent in PWS; research into biological interactions, **particularly genetic**

effects of cultured salmon on wild salmon; integrated monitoring of the fitness of salmon stocks and their progress toward restoration; and, collaboration of partners to restore the Sound by integrating and coordinating activities. These methods, particularly the research and monitoring aspects, follow in concept a model for monitoring interactions of wild and hatchery salmon recently set forth by an international panel of salmon geneticists and conservation scientists convened by NINA (Norweg. Instit. Nature Res.). They emphasize the necessity of monitoring a baseline of genetic and fitness (phenotypic) data, of understanding the extent of gene flow between stocks, and of studying the biological effect of gene flow through quantitative genetic analysis.

The proposed methods anticipate the integrated cooperation of projects independently proposed by other agencies and groups; some of those projects are referenced here. Because of the schedule with which this revision has been undertaken there has not been formal communication and coordination with those agencies and groups. However, no impediments to integration of those projects into the restoration of wild stock resources are anticipated. A workshop is proposed to bring collaborators together to integrate and plan activities.

The work proposed will be carried out in part through the cooperation of several agencies active in salmon resource management in PWS (PWSAC, ADF&G). Portions of the genetic-interaction research will be carried out by the University of Alaska Fairbanks School of Fisheries and Ocean Sciences (SFOS) and will provide opportunity for graduate thesis research and professional development for junior biologists in PWS. PWS residents will participate in field restoration and monitoring activities.

A. Directly restore injured stocks.

1. **Assess and inventory hatchery capabilities:** water regimes, incubation capacity, stock isolation capability, etc. This will be completed to help match hatchery constraints or opportunities with specific injured or depleted wild salmon stocks identified as candidates for restoration which may benefit from hatchery/fish culture intervention.

2. **Incubate eggs taken from injured stocks, returning them as fry to the native site via net pen culture** (cf Draft EIS, Proposed Action, Comprehensive Restoration of Impacts on Fish, Action 3, Ch. 4, p. 124).

3. **Rear and release hatchery fish to divert harvest from injured wild stocks** (cf Draft EIS, Proposed Action, Comprehensive Restoration of Impacts on Fish, Action 4, Ch. 4, p. 124; See C.1. below).

B. Maximize fitness of wild stocks.

1. **Mark or tag hatchery stocks**: a research and monitoring tool.
   a. Coded micro wire tagging: Refer to Project Proposal 95137, 95320: Stock ID and Monitoring Studies.

b. Thermal manipulation of otolith microstructure Contained in Project Proposal 95320C, Otolith thermal mass marking.

2. **Monitor stock baselines:** a reference for assessment of progress; a basis for setting policy for restoration decisions.

a. Census: enumerate stocks of wild salmon by ground surveys in five districts of PWS to contribute to stock baseline information including species, stocks and stock size in oiled and unoiled areas.

b. Demography: fitness and life history traits of stocks: sample age, size, sex, timing, meristic/morphologic information from stocks. This information will aid in identifying injured and depleted stocks which will be targeted for further research, monitoring and possible restoration.

c. Gene frequencies: representative samples of tissues from stocks; contained in Project Proposal 95320D by Seeb & Seeb.

d. Pathogens and parasites: representative samples of tissues, fluids from stocks.

e. Marks and tags: recover marks and tags from representative samples of stocks.

3. **Research genetic interactions of wild with wild stocks; hatchery with wild stocks**

a. Straying/gene flow field experiment: (SFOS Division of Fisheries)
This research is modelled on earlier work on pink salmon at Auke Creek in Juneau by A.J. Gharrett and colleagues. Straying may be estimated by observing physically marked or tagged salmon; however, straying is only one component of gene flow--strays may well not breed successfully to contribute genetically. Our proposed protocol is to screen male returning salmon at a weir, allowing about 20%, those bearing a relatively rare presumably neutral gene, to spawn naturally. This procedure genetically tags the stock; applied with different marker genes to two stocks in the same region, a precise estimate of actual gene flow can be obtained by simple monitoring of the stocks over several generations. Integrates with Project Proposal 95076 by Wertheimer, et al.

b. Fitness phenotype laboratory experiment: quantitative genetic analysis of life history and fitness traits. (SFOS Division of Fisheries)
This research is developed from earlier work on pink salmon at Auke Creek and at Gastineau Hatchery by W.W. Smoker, P.A. Crandell, and colleagues. Gametes sampled from known parents in stocks under restoration will be taken to the incubation laboratory at Juneau and observed under a standard quantitative genetic experimental design. Analysis of observations of fitness-related developmental traits (rates of development, salinity tolerance, etc.) and developmental stability

(fluctuating asymmetry of meristic and morphologic traits) will provide estimates of genetic parameters, and from observations of hybrid families, direct estimates of the fitness effects of gene introgression.

c. Analysis of fitness effects on wild stocks of interactions with cultured fish based on observed PWS data. (SFOS Division of Fisheries) Recent biometrical simulations of hypothetical salmon production systems, modelled on PWS pink salmon, by AJ Gharrett have demonstrated a relationship between ecological productivity (carrying capacity) and the overall fitness benefit of homing or straying. These models will provide a basis for analyzing with biometrical rigor the straying, gene flow, population genetic structure, and quantitative fitness variation data collected by other components of this integrated project.

d. Incorporate genetic interaction insights in rehabilitation activities.

C. Reduce harvest of injured wild stocks by more specific management of wild and hatchery stocks.

1. **Relocate hatchery runs in space or season**(cf Draft EIS, Proposed Action, Comprehensive Restoration of Impacts on Fish, Action 4, 6 Ch. 4, p. 124)

a. Use appropriate remote releases (cf Phase Three Comprehensive Salmon Plan for Prince William Sound/Copper River). Based on site selection criteria and site evaluation, imprint and remote release hatchery fish to reduce possible harvest pressures on injured wild stocks which might migrate through fisheries conducted near hatcheries or targeting enhanced salmon migrating to the hatchery of incubation and rearing. For example, hatchery salmon could be released in the Eastern, Southeastern and/or Montague Districts, thereby distributing the commercial fleet and reducing harvest pressures on injured stocks in the Northwestern and Southwestern Districts.

b. Develop new hatchery stocks with inherent run timing different from injured wild stocks (cf Phase Three Comprehensive Salmon Plan for Prince William Sound/Copper River). Identify and select from the salmon stock census, stocks which have adult return run time different from that of injured or depleted wild stocks which may be currently harvested in fisheries targeting returning hatchery salmon. By culturing temporally isolated salmon stocks, fisheries can be managed without placing additional pressure on injured stocks. Consideration must be given to species in addition to pink salmon if those species provide the temporal and spatial isolation necessary to reduce pressures on injured pink stocks. Of particular potential are early run time chum and sockeye salmon.

2. **Identify hatchery stocks in season and manage harvests accordingly.** Otolith marking and CWT tag recovery and assessment (B.1. above).

D. **Project collaboration and activity integration.**

1. **Convene working group** of research and restoration collaborators. Agencies, organizations and groups which are identified by PWSAC as required within a collaborative network for salmon restoration to complete the objectives outlined within this proposal, will convene in Cordova to integrate objectives and activities including and in addition to those outlined within this proposal.

2. **Integrate projects** while formulating strategies and agreements towards implementation of activities. Establish project manager and management team, communication and decision making protocols, priorities and implementation plans.

E. **Employ resident sector-specific technical teams (5 sectors corresponding to major fishing districts, see Figure 1).** Teams responsible for surveys, sampling, egg takes, pen rearing, etc. Communications have been initiated with **Eyak Tribal Council** on project potentials and participation.

1. **Contract five vessels and crew** for field work including stream surveys, escapement enumeration, stock sampling, egg take, netpen and fry rearing support or other salmon restoration activities identified as appropriate. PWSAC will exercise standard contract procedures and employment options.

2. **Provide technical training** to crews in salmon escapement enumeration, and working with technical, academic and professional staff in genetic, disease and marked salmon recovery sampling, fish culture techniques, restoration methods and stock monitoring. Training will be provided survey, monitoring, sampling and fish culture crews by PWSAC, ADF&G and University of Alaska SFOS as required.

3. **Deploy vessels and teams** for stream surveying, stock assessment, sampling, restoration activities and monitoring. Historic observations indicate that early returning salmon stocks spawn in the Eastern and Southeastern Districts. Therefore, two vessels and technical teams are to be deployed to those sectors from June 23 to August 15. Beginning August 15, five vessels and crews are to be deployed, one to each sector of PWS, and remain in the field until September 25. The project leader and field technicians trained and assigned to each vessel and sector will survey, sample, monitor, compile data and report as required. Additional assignments may include, based on restoration requirements, taking eggs, managing net pens, rearing fry for imprinting, or other enhancement or rehabilitation activities.

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V. Schedule for FY-95

NOTE: The schedule is presented for FY-95. Specific objectives and activities are intended to occur annually to encompass two (2) life cycles for both odd year and even year pink salmon. A schedule will be presented in the detailed project description (DPD) which delineates the workplan through the year 2002. A generalized listing of the extended workplan and timeline is presented in **Figure 2.**

Activity	Begin	End
Convene workshop		
Contact all collaborators	1/95	1/95
Convene workshop	2/95	2/95
Integrate objectives/activities	2/95	2/95
Finalize workplans	2/95	3/95
Evaluate hatchery capabilities		
Analyze facility temp and water flows	1/95	2/95
Review incubation and facility floor plans	2/95	3/95
Compute species/stock limitations	2/95	3/95
Report on recommendations	3/95	4/95
Develop five sector technical teams		
Contract vessels and crews	1/95	4/95
Contract technicians	3/95	4/95
Train field crews	4/95	5/95
Monitor stock baselines		
Stock surveys	6/95	10/95
Census/demographics	6/95	10/95
Marks/tags/tissue samples	6/95	10/95
Direct restoration		
Incubate injured-stock eggs	7/95	12/95
Survey injured stocks	6/95	10/95
Collect injured stock eggs	6/95	10/95
Incubate embryos	8/95	12/95
Pen rear & release fry	1996	
Evaluate & revise plan	1996	
Recover marks/tags	1997	
Plan next cycle	1997	
Realign hatchery stock releases		
Remote release hatchery fish	4/95	6/95
Survey sites	4/95	5/95

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Activity	Begin	End
Pilot scale releases	4/95	5/95
Evaluate releases/returns	1996	
Production releases	(decision point)	
Develop new broodstocks	7/95	12/95
Survey stocks	7/95	10/95
Remote egg takes	7/95	10/95
Incubate and release	8/95	1996
Geneflow field experiment		
Establish genetic tag (2 camps/screen males)	7/95	9/95
Sample returns	1997	
Analyze gene flow	1997	
Report	1998	
Quantitative genetic analysis of fitness traits		
Sample gametes in field	7/95	10/95
Incubate embryos in lab and gather data	10/95	1996
Analyze	1996	
Report	1997	
Model fitness effects of genetic interactions: develop simulation models for:		
Gene flow and drift	2/95	11/95
Single locus selection	7/95	1996
Quantitative/fitness trait	12/95	1997
population dynamics	1996	1997
Incorporate PWS data	1998	
Report		

VI. Technical support

Technical support will include the services of:

- PWSAC planning, project management and fish culture staff
- ADF&G biologists and technicians
- University of Alaska geneticists and other experts in this field
- ADF&G pathologist
- permitting agencies including ADF&G, Department of Army, Corps of Engineers, Department of Natural Resources
- ADF&G otolith mark analysis lab

VII. Location

This project will take place in Prince William Sound. Field crew activities will take place within districts of PWS as divided into five sectors (Figure 1) including the Southeastern, Eastern, Northern-Coghill-Northwestern, Southwestern and Montague Districts. Hatchery incubation and rearing of wild stock salmon will occur at PWSAC hatchery facilities; specific facilities selected will be based on evaluation of site capabilities and wild stock biological requirements. PWSAC facilities include the Armin F Koernig Hatchery on Evans Island, the Main Bay Hatchery near Crafton Island, the Wally Noerenberg Hatchery on Esther Island, and the Cannery Creek Hatchery in Unakwik Inlet.

VIII. Project Implementation

PWSAC will implement the project in conjunction with ADF&G as the lead agency and other collaborating organizations. Restoration management will be based within PWSAC and PWSAC will be responsible for coordinating activities under this proposal including research, restoration and monitoring.

IX. Coordination of Integrated Research Effort

Activities of the salmon restoration program will be integrated with ongoing genetic investigations, stream analysis, stock identification and monitoring studies, and otolith marking **(Figure 3)**.

X. Public Process

PWSAC is a regional association which by law (AS 16.05.380.) must include on their boards representatives of sport fishermen, municipalities, and Native organizations, in addition to commercial fishermen and processors. It is PWSAC's mission to optimally produce salmon for the benefit of all user groups.

As a mechanism to restore PWS salmon resources and services, the PWSAC salmon restoration project will incorporate existing research results achieved through projects previously and currently funded by the EVOS Trustee Council process. In addition, specific stock and stream restoration options may be recommended by users and villages within PWS. Local vessels, skippers and crews will be solicited from interested public and contracted for training and field work.

XI. Personnel Qualifications

Personnel: PWSAC

H.J. Ferren
Special Project Manager, Planner
M.S. Biological Oceanography, University of Alaska
Corporate strategic and tactical planning, regional salmon planning, team facilitation and project management.

Personnel: University of Alaska, SFOS

W.W. Smoker
Professor of Fisheries, SFOS.
PhD Fisheries, Oregon State Univ.
Research in salmon ocean ranching, quantitative genetics of Pacific salmon.

A.J. Gharrett
Professor of Genetics, SFOS
PhD Genetics, Oregon State Univ
Research on molecular genetics, population genetics of Pacific salmon.
Recognized expert on population genetics of Pacific salmon, Genetic Stock Identification, genetic tagging

Patricia A. Crandell
Postdoctoral Fellow and Research Associate, SFOS
PhD Aquaculture Genetics, Biometrics Univ. of Calif Davis
Research on quantitative genetics of pink salmon, ploidy manipulation in Pacific salmon
Expertise in experimental design and statistical analysis.

Andrew Gray
Research Associate, SFOS
MS Genetics, Washington State University
Molecular genetics techniques, Electrophoretic analysis of allozymes, DNA analysis

Budget FY95

PWSAC		
100	Personnel	$135,120
200	Travel	$30,700
300	Contractual Services	$747,000
	Administration	$161,895
400	Commodities	$32,480
500	Equipment/capital	$134,000
	SUBTOTAL	$1,241,195
UAF SFOS (partner in genetics)		
100	Personnel	$231,080
200	Travel	$7,200
300	Contractual Services	$16,000
	Administration	$74,856
400	Commodities	$20,000
500	Equipment/capital	$100,000
	SUBTOTAL	$449,136
TOTAL PROJECT BUDGET		**$1,690,331.**

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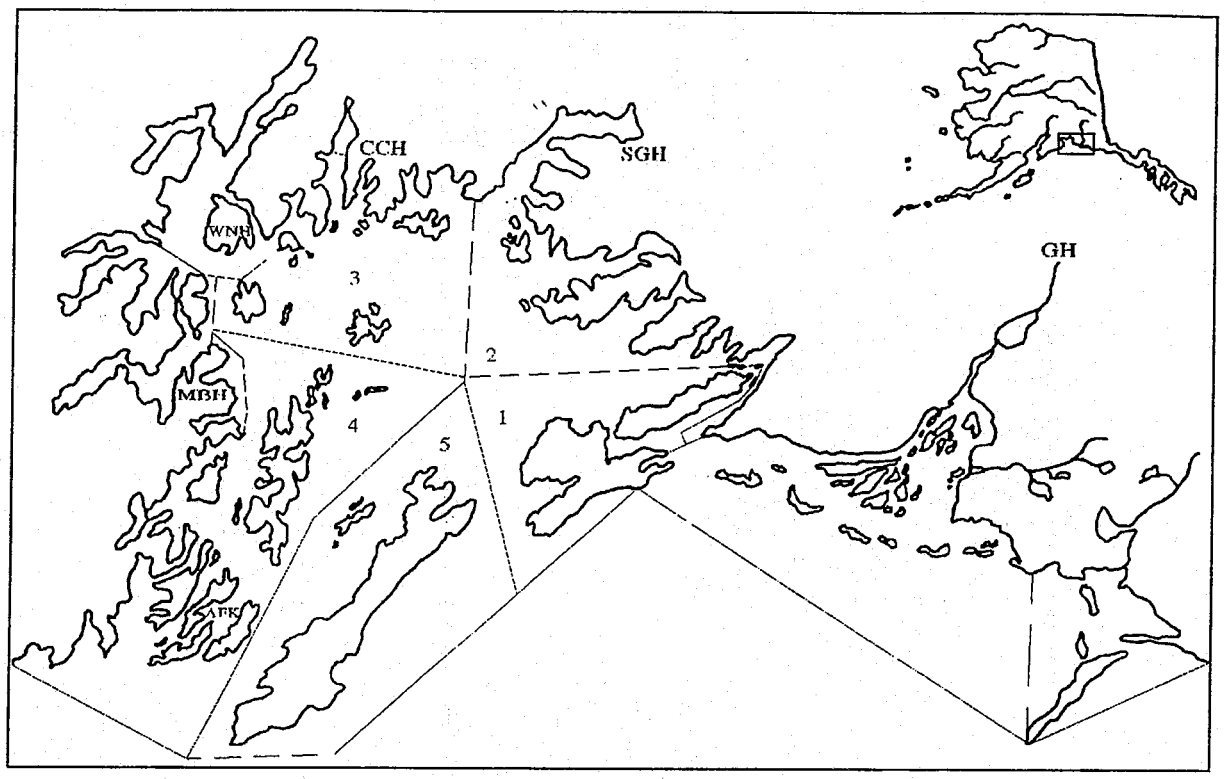
Figure 1

Prince William Sound

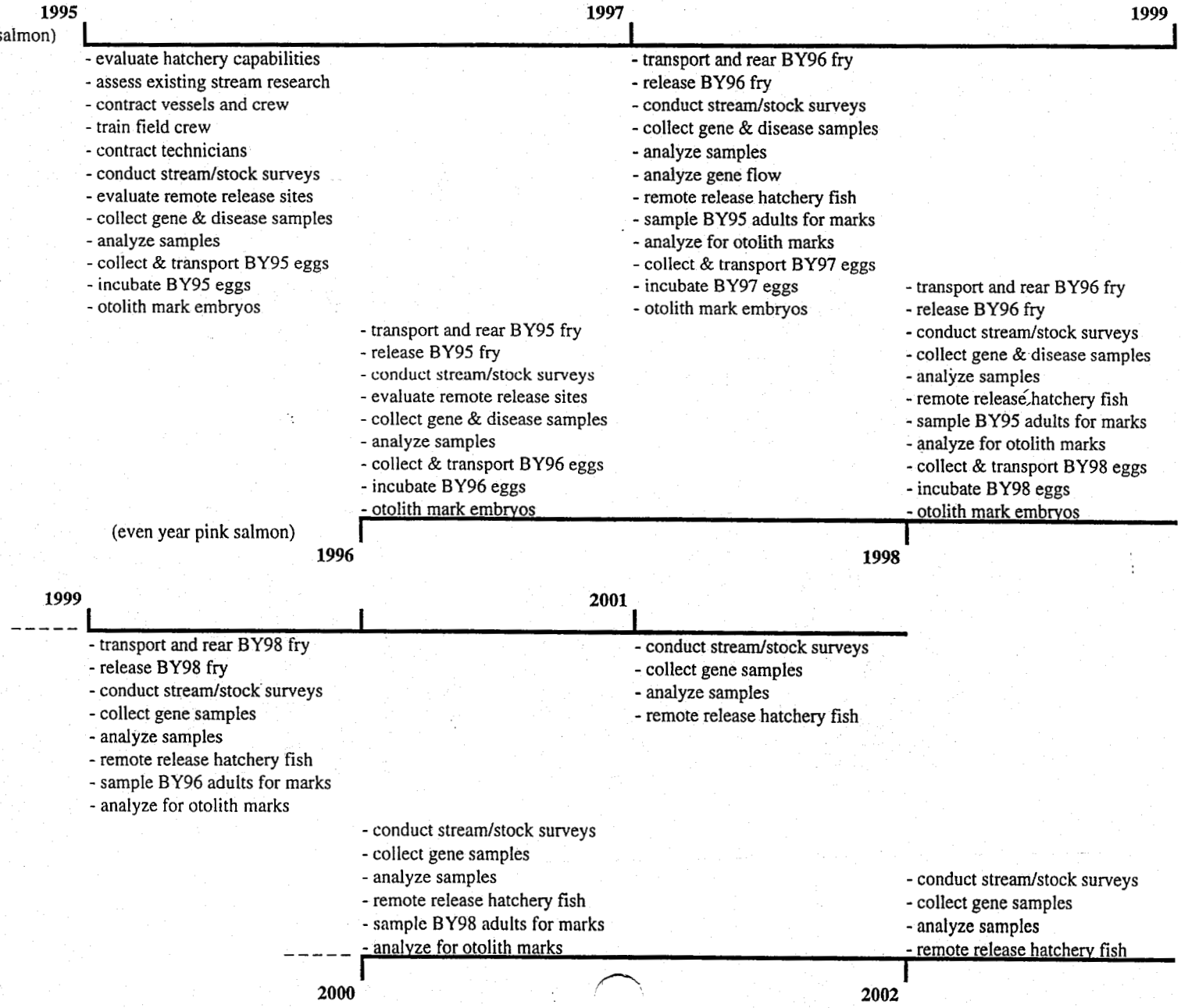
Sectors for Research, Restoration and Monitoring



Sectors	Hatcheries
1: Southeastern District	_____
2: Eastern District	Solomon Gulch
3: Northern-Northwestern-Coghill Districts	Cannery Creek Wally Noerenberg
4: Southwestern-Eshamy Districts	Main Bay Armin F. Koernig
5: Montague District	_____

Figure 2: Time-line and activities

(\pwsac\evos\fig95-2)



#4S96

EVOS Trustee Council: Project Description
Restoration of PWS Wild Stock Salmon Resources and Services
(pwsac\evos\fig95-3)

Figure 3: Integration of Research, Restoration and Monitoring

COMPONENT	ACTIVITY	INTEGRATION
Research	Stream - stock identification	ADF&G USFS PWS resource users
Research	Stream - stock surveys and escapement enumeration	PWSAC ADF&G Trained technicians and vessel crews
Research	Genetic and disease sampling	Technicians ADF&G
Research	Gene analysis; gene flow simulation	ADF&G University of Alaska, SFOS NMFS: Auke Bay Lab
Research	Disease analysis	ADF&G
Research	Evaluate remote release sites for hatchery fish	PWSAC ADF&G
Restoration	Egg-take from wild stock system(s)	PWSAC ADF&G technicians Vessel crews
Restoration	Incubation and rearing wild stock	PWSAC
Restoration	Imprint and release wild stock	PWSAC Vessel crews
Restoration	Remote release hatchery fish	PWSAC ADF&G
Research	Otolith marking	ADF&G PWSAC
Research and monitoring	Adult return, enumeration and otolith mark sampling	PWSAC ADF&G technicians Vessel crews
Research and monitoring	Otolith analysis	ADF&G

Quantification of Stream Habitat for Harlequin Ducks and Anadromous Fish Species from Remotely Sensed Data

Project Number:	95095
Restoration Category:	Habitat Protection
Proposed By:	Richard Podolsky, PhD. Avian Systems, Inc. 1275 15th St. #15G Fort Lee, NJ 07024-1929 Tel: (201) 224-2025; FAX: (201) 224-2566
Lead Trustee Agency:	NOAA
Cost FY 95:	$88,000
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Oil spill area
Injured Resource/Service:	Harlequin duck

INTRODUCTION

Harlequin ducks (*Histrionicus histrionicus*), feed in the shallowest water of all the seaducks in Alaska. Consequently, they were heavily impacted by the *Exxon Valdez* oil spill. Furthermore, because of the persistence of oil in certain estuaries, harlequins appear to be suffering from continued, chronic exposure to oil. Nearly total nesting failure of harlequins apparently has ocurred in the spill area. Identification and protection of nesting habitat through land acquisition, therefore, is critical to the recovery of this species.

PROJECT DESCRIPTION

Harlequins congregate at the mouths of fast streams where they nest. The goal of this study is to analyze aerial photographs and satellite imagery in order to identify and map all potential nesting streams in the spill area. With the aid of a geographic information system the distribution of historical or current harlequin nests will be incorporated.

The goal will be to prioritize sites in terms of their potential to support harlequins and make this information available to those charged with land acquisitions. Any land acquisitions made as a result of this study will also benefit the species of anadromous fish that co-occur in these streams.

Methods

1. Analyze satellite or aerial photos identifying all major and minor streams. This can be accomplished with GIS software such as GAIA, that allows the coregistration and overlay of hydrography vectors to the raster imagery.

2. Catalogue all major and minor streams and rank them according to their value as potential harlequin nesting habitat.

3. Build a GIS that includes the following data layers: imagery, historical harlequin nest sites, current harlequin nest sites, stream stretch ranking in terms of water motion, vegetation cover etc., vectorized hydrography, and proximity to shallow estuaries for feeding.

4. Recommend specific sites to be acquired to maximize the number of harlequins and their reproductive output.

Restoration of Murres by way of Social Attraction and Predator Removal

Project Number:	95096
Restoration Category:	General Restoration
Proposed By:	Dr. Richard Podolsky Dr. Stephen Kress National Audubon Society 1275 15th St. #15G Fort Lee, NJ 07024-1929 Tel: (201) 224-2025; FAX: (201) 224-2566
Lead Trustee Agency:	DOI
Cost FY 95:	$167,000
Cost FY 96:	$167,000
Total Cost:	$668,000
Duration:	4 years
Geographic Area:	Oil spill area
Injured Resource/Service:	Common murre

INTRODUCTION

Common Murres (*Uria aalge inornata*) were the most heavily affected bird species as a result of the Exxon Valdez Spill. Restoration of selected populations and enhancement of habitat by way of auditory and visual attraction of pre-breeders in combination with removal of predatory mammals such as Arctic Fox, could be an important technique for reducing the recovery time of murre population.

PROJECT DESCRIPTION

Pre-breeding seabirds are known to wander widely in the years before breeding. During this prospecting phase it has been shown that behavioral attraction (sound playback and presentation of decoys or models) is an effective means of luring seabirds to new or extirpated habitat especially when done in conjunction with predator removal. The result could be a reduction in the recovery time, especially for Murres. Work by National Audubon with murres

and other seabirds in the Gulf of Maine has shown that they are lured to habitat where predators have been eradicated.

Murres accounted for 61% of the dead birds recovered after the spill (22,000 of 36,000). But because many oiled birds were lost at sea or along the shores, the number of recovered murres represents perhaps only 5-10% of the total number of murres killed by the spill. It is therefore likely that in excess of one hundred thousand murres were killed as a result of the spill. This translates into a major mortality event that will affect the reproductive performance and population stability of murres in Alaska for years to come. It is known already that this mortality event has caused complete reproductive failure in some large colonies in each year since the spill, and this loss represents the cumulative lost production of some 300,000 young. Reasons for this "echo" of lost production into subsequent years is complex, but may have to do with the fact that many surviving adults have had to find new mates, a process that can be followed by several years of failed reproduction.

Methods

1. Conduct appropriate attraction trials at extirpated habitat within the spill area.

2. Conduct appropriate attraction trials at predator infested colonies within and/or outside the spill area (such as Walrus Island in the Aleutian Islands).

Restoration of Murres by Way of Transplantation of Chicks: A Feasibility Study

Project Number: 95097

Restoration Category: General Restoration

Proposed By:
Dr. Richard Podolsky
Dr. Stephen Kress
National Audubon Society
1275 15th St. #15G
Fort Lee, NJ 07024-1929
Tel: (201) 224-2025; FAX: (201) 224-2566

Lead Trustee Agency: DOI

Cost FY 95: $176,000

Cost FY 96: Unknown

Total Cost: Unknown

Duration: 4 years

Geographic Area: Oil spill area

Injured Resource/Service: Common murre

INTRODUCTION

Common murres (*Uria aalge inornata*) were the most heavily affected bird species as a result of the *Exxon Valdez* Spill. Restoration of selected populations by way of transplantation and hand-rearing of chicks could be an important technique to reduce the recovery time of the murre population.

PROJECT DESCRIPTION

Translocation and hand-rearing of alcids has been successful in reestablishing Atlantic Puffins to former breeding sites in the Gulf of Maine. Similar methodologies might be adaptable to Common murres and result in the re-establishment or enhancement of colonies impacted by the spill. Thus, the goal of this project is to conduct the background research necessary to ascertain whether this approach is adaptable and feasible with Common murres and whether any

significant restoration potential might be realized through this methodology.

Murres accounted for 61% of the dead birds recovered after the spill (22,000 of 36,000). But because many oiled birds were lost at sea or along the shores, the number of recovered murres represents perhaps only 5-10% of the total number of murres killed by the spill. It is therefore likely that in excess of one hundred thousand murres were killed as a result of the spill. This translates into a major mortality event that will affect the reproductive performance and population stability of murres in Alaska for years to come. It is known already that this mortality event has caused complete reproductive failure in some large colonies in each year since the spill, and this loss represents the cumulative lost production of some 300,000 young.

Reasons for this "echo" of lost production into subsequent years is complex, but may have to do with the fact that many surviving adults have had to find new mates, a process that can be followed by several years of failed reproduction.

Methods

1. Conduct appropriate experiments in such places as the Barren Islands to ascertain the feasibility for translocations of Common Murre chicks from large colonies outside the spill area.

2. Conduct the appropriate trials to establish a methodology for human-rearingof murre chicks.

Identification of Seabird Feeding Areas from Remotely Sensed Data (AVHRR and/or Landsat MSS) and Its Impact on Restoration Efforts

Project Number:	95098
Restoration Category:	General Restoration
Proposed By:	Dr. Richard Podolsky Dr. Stephen Kress National Audubon Society 1275 15th St. #15G Fort Lee, NJ 07024-1929 Tel: (201) 224-2025; FAX: (201) 224-2566
Lead Trustee Agency:	DOI
Cost FY 95:	$74,000
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Oil spill area
Injured Resource/Service:	Multiple resources

INTRODUCTION

Restoration efforts for seabirds should be focused on areas with the greatest likelihood of maximizing reproductive output and minimizing risk from human activities.

PROJECT DESCRIPTION

The two factors that are most important to the distribution and abundance of seabirds are: 1) the proximity to rich feeding areas, and 2) disturbance-free (especially predator-free) island habitat. Assessing the quality of seabird habitat entails measuring at least these two variables. These data can then be used to identify seabird "hot-spots", and 1) focus the restoration efforts in these areas and 2) identify hot-spots to be avoided by any shipping activities that pose the risk of spilling hazardous materials.

When abundant island habitat exists in close proximity to rich feeding grounds than seabird colonies typically attain impressive concentrations. These concentrations are at significant risk, however, when they co-occur with certain types of human activities, most notably the shipping of hazardous substances.

Methods

1. Collect and summarize existing information on the distribution and abundance of seabirds within foraging distance (@200 km) of the islands and shores impacted by the Exxon Valdez Spill.

2. Measure the productivity of the ocean within foraging distance (@200 km) of the islands and shores impacted by the Exxon Valdez Spill by analyzing ocean fronts, algae blooms, chlorophyll concentrations and related phenomenon from AVHRR (Advanced Very High Resolution Radiometer) and/or Landsat MSS (Multispectral Scanner) data.

3. Examine the degree to which seabird distribution correlates with ocean productivity. Prioritize coasts and islands as a function of the overall quality of their seabird habitat and make logical recommendations to all appropriate agencies.

Marbled Murrelet Vocalizations in Conjunction with Artificial Nests: A Possible Means of Attraction to Restored or Acquired Habitat

Project Number:	95099
Restoration Category:	General Restoration
Proposed By:	Richard Podolsky, PhD. Avian Systems, Inc. 1275 15th St. #15G Fort Lee, NJ 07024-1929 Tel: (201) 224-2025; FAX: (201) 224-2566
Lead Trustee Agency:	DOI
Cost FY 95:	$77,000
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Oil spill area
Injured Resource/Service:	Marbled murrelet

INTRODUCTION

Marbled murrelets (*Brachyramphus marmoratus*) were among the most heavily affected bird species as a result of the *Exxon Valdez* Spill. Restoration of selected populations by way of auditory and visual attraction of pre-breeders in conjunction with artificial nests could be an important technique to reduce the recovery time of the murrelet population.

PROJECT DESCRIPTION

Playback of vocalizations has been shown to be an effective method of attracting many seabirds including: alcids, terns, albatrosses, storm-petrels and gadfly petrels. Both storm-petrels and gadfly petrels have been successfully lured to artificial nests augmented with playback of vocalizations. Because this method has not been attempted with murrelets, the goal of this project is to ascertain whether murrelets are attracted to playbacks or other relevant sounds and whether there is any significant management potential to be realized through combining these

stimuli with the presentation of artificial nests.

Methods

1. Conduct appropriate experiments on Knight and Naked Islands in order to ascertain whether murrelets are attracted to playback of vocalizations or other relevant sounds.

2. Conduct appropriate experiments on Knight and Naked Islands in order to ascertain whether the number of murrelets observed, during dawn watches or through other population assessment methods, can be increased by broadcasting various sounds.

3. Ascertain whether murrelets are attracted to, or will use, artificial nests with or without vocalization playback.

Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound

Project Number:	95102-CLO
Restoration Category:	Research (closeout)
Proposed By:	DOI
Cost FY 95:	$63,800
Cost FY 96:	$0
Total Cost:	$63,800
Duration:	1 year
Geographic Area:	Not applicable
Injured Resource/Service:	Marbled murrelet

INTRODUCTION

This project is the closeout of 94102 - Murrelet Prey and Foraging Habitat in Prince William Sound. The purpose of the project was to identify prey species, locate foraging areas, determine foraging patterns from known nesting areas, and characterize important feeding habitat for marbled murrelets.

NEED FOR THE PROJECT

To complete data analysis and write report for FY 94 field work.

PROJECT DESIGN

A. Objectives

The purpose is to analyze 1994 project data and prepare a final report. The report will be prepared for the peer-review process and presentation to the Trustee Council.

B. Methods

Not applicable.

C. Schedule

October - December:	Data analysis
December - January:	Report writing
February 15:	Draft report
March 31:	Final report

D. Technical Support

Not applicable.

E. Location

Report preparation will occur at the Fish and Wildlife Service Regional Office in Anchorage, Alaska.

PROJECT IMPLEMENTATION

The USFWS is the most appropriate entity to analyze the data and write the report.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Not applicable.

FY 95 BUDGET ($K)

Personnel	55.5
Travel	0.0
Contractual	0.0
Commodities	0.0
Equipment	0.0
Subtotal	55.5
Gen. Admin.	8.3
Total	63.8

Subtidal Site Verification

Project Number:	95107
Restoration Category:	Monitoring
Proposed By:	University of Alaska Fairbanks.
Lead Agency:	Alaska Department of Fish & Game
Cost FY 95:	$56,200
Cost FY 96:	$42,000 (data analysis and report writing only)
Total Cost:	$98,200
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Subtidal organisms

INTRODUCTION

The optimal design for environmental impact monitoring includes sampling both before and after a disturbance event, at pairs of impacted and control sites. This is referred to as the BACIP (Before-After, Control -Impact Pairs) design. Very few of the current studies of the effects of the EVOS have been able to use this design because of the lack of pre-spill data. Instead, we have relied on sampling at pairs of oiled and control sites after the spill to infer injury to biological resources in coastal habitats. This is the ACIP (After Control-Impact Pairs) design. Correct interpretation of the results produced from this design are based on the assumption that oiled and control sites would not have differed if there were not an oil spill.

There are resources within the subtidal habitats that have shown consistent differences among oiled and control sites using the ACIP design. For example, *Musculus* density on eelgrass in Prince William Sound has been consistently higher at oiled sites. Without pre-spill data, it is difficult to establish whether these differences represent long-term impacts of the spill, or whether they represent inherent differences among sites that resulted from bias in the site selection process. For example, it may be that predominant wind and current conditions within the Sound that were responsible for bringing oil to specific beaches, are also responsible for bringing higher concentrations of *Musculus* larvae to those same beaches.

There are essentially two ways to help address this issue. First, long-term monitoring of

resources could be conducted and evaluated to determine if the resources at oiled and control sites "converge" after some period of time. This approach suffers from the fact that convergence may take very long to occur, or may never occur if some alternate stable state has been achieved after the spill. In the shorter term, agencies are faced with making decisions regarding possible restoration of supposedly injured resources. A second approach is to conduct an independent test of our ability to match oiled and control sites, and to demonstrate that the site selection process produced no biases that may have resulted in inherent differences among oiled and control pairs.

The verification of the process by which matched pairs are selected also has much larger implications with respect to monitoring programs that may be used to evaluate impacts of future oil spills as well as other disturbances. Because of the uncertain time and location of impact of oil spills, it is extremely difficult to obtain the appropriate "pre-spill" data at both impacted and control sites. Costly "baseline" monitoring programs often result in data that is largely unusable for evaluating injuries, and evaluation of injuries from spills almost always relies on sampling conducted only after the spill. The establishment of *a priori* criteria for the selection of oiled and control sites, and the *a priori* verification that this selection process does not produce biases in oiled-control comparisons, would be very useful in supporting inferences made from post-spill surveys in future spills. In addition, establishment and verification of *a priori* site selection criteria, could prove much more useful, and much more cost effective, than baseline monitoring studies. Establishing *a priori* criteria for selection of matched pairs could prove to be a useful monitoring tool in Prince William Sound as well as elsewhere.

NEED FOR THE PROJECT

A study is needed to test of our ability to match oiled and control sites, and to demonstrate that the site selection process produced no biases that may have resulted in inherent differences among oiled and control pairs.

PROJECT DESIGN

A. Objectives

1. Determine if previously used site selection criteria may have resulted in biases that could lead to inherent differences among oiled and control sites that were unrelated to oiling.

2. Establish criteria for the unbiased selection of oiled and control site pairs to be used in assessing injury from future oil spills or other disturbances.

B. Methods

We will test our ability to select appropriate matched pairs of sites by sampling at "simulated oiled" sites and their matched controls. An oil spill simulation model will be used to define a potential universe of "simulated oiled" sites. (Work on oil spill simulation will be the same as used in intertidal studies, and will be funded under that project). We will select a set of "simulated oiled" sites from this universe and select matched control sites using procedures used in earlier injury assessment studies. We will then sample at both simulated oiled and control sites and test for significant differences among sites. Variates measured and sampling methods will be similar to that described for the monitoring program. These studies will be conducted only within one depth strata, within eelgrass beds (< 3 m). A total of four pairs of sites will be visited.

C. Schedule

The field work for this project will begin in June 1995 and conclude in July 1995. Data analysis and draft report preparation will be completed in May 1996. Deliverables will consist of a FY 95 progress report to be submitted in September 1995, and a final report to be completed by May 1996.

D. Technical Support

Technical support includes a small float plane and small (< 32 ′) vessel for site selection verifications in June. The bulk of the site selection verifications will occur during subtidal eelgrass habitat sampling in July.

E. Location

The project will be undertaken in Prince William Sound.

PROJECT IMPLEMENTATION

The principal investigators have been conducting damage assessment/monitoring studies in the shallow subtidal regions of Prince William Sound since 1989. Since these studies have mainly been implemented through Alaska Department of Fish & Game (ADFG), and since this project will overlap with the ongoing work in the subtidal eelgrass habitat, it is appropriate for this project to also be implemented through ADFG.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will integrate with the subtidal eelgrass habitat investigation, as well a similar

project for Coastal Habitat Intertidal Site Verification.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	49.3
Commodities	0.0
Equipment	0.0
Subtotal	52.3
Gen. Admin.	3.9
Total	56.2

Habitat Protection - Data Acquisition and Support

Project Number:	95110-CLO
Restoration Category:	Habitat Protection (closeout)
Proposed By:	Habitat Work Group
Lead Agency:	ADNR
Cooperating Agencies:	ADFG, DOI, USFS
Cost FY 95:	$144,000
Cost FY 96:	$0
Total Cost:	$144,000
Duration:	1 year
Geographic Area:	Prince William Sound, Kenai Peninsula, Alaska Peninsula, and Kodiak Archipelago
Injured Resource/Service:	Multiple resources

INTRODUCTION

This project is designed to support habitat protection activities of the Trustee Council and is a close-out of project 94110. In 1993 Habitat Protection Work Group conducted a survey and assessment of selected parcels of private land within the oil spill zone. The lands were scored, ranked and mapped using the Trustee Council approved Evaluation Process to determine the value of these areas to injured resources and services and the benefits that could be achieved through habitat protection. The evaluation was done using a variety of available data and information gathered from various agencies and technical experts, data collected during The Nature Conservancy Workshop, Natural Resource Damage Assessment reports, and site reconnaissance field visits.

In 1994, a method was developed for nominating, processing, evaluating and ranking parcels of private land less than 1000 acres, i.e., *The Small Parcel Process*. Responses to the solicitation for nominations of small parcels are currently being processed and evaluated. Evaluations, starting with field surveys, of large and small parcels submitted this Spring will also continue into the Fall.

NEED FOR THE PROJECT

The need for the close-out work on project 94110 is to complete evaluations of lands nominated during this summer and fall and to prepare reports. Results of large parcel evaluations will be submitted to the Trustee Council as a supplement to Volume I of the Comprehensive Habitat Protection Process document. The results of the Small Parcel Process will be submitted to the Trustee Council as a separate volume of the Process.

PROJECT DESIGN

A. Objectives

1. Evaluation, restoration unit design, scoring and ranking of selected private parcels.

2. Mapping of evaluation units.

3. Preparation of supplement to Volume I of the Comprehensive Habitat Protection Process document for Trustee Council review and negotiations with landowners.

4. Preparation of Volume III *Small Parcel Evaluation and Ranking Comprehensive Habitat Protection Process* for Trustee Council review and negotiations with landowners.

B. Methods

Existing data and data obtained by HPWG in 1993 and 1994 will be analyzed to fill data gaps to the maximum extent possible. This will include some additional programming, data base management, and GIS work to sort data and to map resource information where appropriate.

Primary and secondary evaluations, for large and small parcels, will be conducted by the HWG using evaluation formats developed by the group.

Volume III and the supplement to Volume I will be prepared in a format consistent with Volumes I and II.

C. Schedule

Evaluation and ranking of small parcels will occur during this summer and fall. It is anticipated that negotiations for small parcels will commence in January 1995. Field surveys of recently nominated large parcels will occur this summer. Evaluation results, including scoring and ranking, of both large and small parcels will be submitted to the Trustee Council in the fall.

D. Technical Support

The Alaska Department of Natural Resources LRIS group will produce all maps. The HWG will

produce all documents.

E. Location

The analysis will cover all selected lands within the oil spill zone. Lands are located within Prince William Sound, Kenai Peninsula, Kodiak/Afognak Archipelago and on the Alaska Peninsula.

PROJECT IMPLEMENTATION

The proposed project is a continuation of 94110. Habitat protection projects were started in 1992 by the Restoration Planning Work Group and outlined in concept in Volume I of the *Restoration Framework*. Implementation of this project would be by the Habitat Work Group. This group includes four members representing ADNR, USFS, ADFG and USFWS. The HWG includes three individuals who have been working on the spill since early 1989 and who participated in the genesis and development of habitat protection as a restoration strategy. All four members are authors of the *Comprehensive Habitat Protection Process* report and participated in the development of the *Small Parcel Process*.

COORDINATION OF INTEGRATED RESEARCH EFFORT

All habitat protection efforts including this project are dependent upon the results of on-going research and monitoring projects. For example, the Large Parcel Element used information from the anadromous fish stream catalog, colonial seabird catalog, bald eagle nesting maps, and data from Trustee Council funded studies on black oystercatchers, marbled murrelets and pigeon guillemots.

FY 95 BUDGET ($K)

Personnel	73.2
Travel	6.0
Contractual	48.0
Commodities	2.4
Equipment	0.0
Subtotal	129.6
Gen. Admin.	14.4
Total	144.0

Sustainable Rockfish Yield

Project Number:	95111
Restoration Category:	General Restoration
Proposed By:	ADFG
Cost FY 95:	$222,600
Cost FY 96:	$334,000
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound, outer Kenai Peninsula
Injured Resource/Service:	Rockfish

INTRODUCTION

Rockfish include species in the genera *Sebastes* and *Sebastolobus*. Commercial rockfish harvests increased four-fold due to closures of the commercial salmon and shellfish fisheries following the EVOS. Recreational rockfish harvests have also increased, particularly in response to an increasing number charter operators. Rockfish harvest rates have remained high. In addition, rockfish mortalities attributable to oil ingestion were observed immediately after the EVOS. Subsequent histopathological sampling indicated continuing population injury. Because rockfish exhibit extreme longevity, slow growth, and late maturity, depressed populations recover very slowly. Due to concerns over the sustainability and yield from the rockfish resources, regulations have been implemented in recent years to reduce commercial and sport fishing harvest. Even with the curtailment of human use, the impacts and rebuilding of a severely depleted rockfish population may continue through several human generations.

Little information is available on rockfish abundance and composition in the EVOS-impacted area. Lacking data on population abundance, composition, and production, an estimate of maximum sustainable yield is unknown. The Alaska Department of Fish and Game (ADFG) has attempted to increase the assessment of rockfish resources in recent years. However, both surveys and follow-up analyses have suffered from a lack of available funding. This project would compile and analyze existing data and conduct surveys to estimate relative rockfish population size and composition. The goal is to develop a management plan that assures recovery of damaged stocks and long-term sustainable yield.

NEED FOR THE PROJECT

Relative to many other marine species, rockfish exhibit extreme longevity (>50 yrs), slow growth, and late maturity (7-20 yrs). Many rockfish species also have localized distributions. These characteristics reflect the relatively low annual productivity of rockfish, making these species highly susceptible to overfishing. Once depressed, populations recover very slowly.

Rockfish populations suffered direct mortalities and sublethal effects from the oil spill. Indirect spill impacts included an increase in effort directed at groundfish resources in general and rockfish in particular as traditional fishing opportunities such as salmon and shellfish declined or were curtailed to prevent product contamination by petroleum products. Rockfish are an integral, resident component of the spill area ecosystem. The loss of rockfish resources through direct and indirect effects following the spill may severely alter energy transfer within the spill area. While ADFG has authority to curtail commercial and recreational fishing, that authority is dependent upon a meaningful and defensible biological justification.

Rockfish are difficult to study because of their unique habitat and physiological characteristics. Despite the importance of rockfish to the ecosystem and the potential for long-term damage from overfishing, there have been few studies to directly assess rockfish resources in the spill area. Because commercial rockfish fisheries typically generate a relatively low economic value, rockfish have a low institutional priority. Although limited rockfish sampling has provided some biological data, this low priority has left much data unprocessed.

This project is severely needed to compile and analyze data previously collected, to conduct fishery independent surveys to better assess the role that rockfish fill in the ecosystem, and to develop a management plan which modifies human use patterns to allow damaged stocks to recover and assure for the long-term yield of the rockfish resource.

PROJECT DESIGN

A. Objectives

The goal of this project is to develop a plan that modifies human use to provide for restoration of rockfish resources in the area impacted by the EVOS. Initial objectives of this study are to:

1. Describe biological characteristics of the rockfish resources. Through port sampling and fisheries-independent test fishing: describe stock composition, mortality, growth, relative abundance, and relative recruitment.

2. Clarify rockfish stock definition. Tagging studies will further identify stock movements and potential recruitment.

B. Methods

1. Species, sex, size, and age data will be collected from commercial landings at ports and processors where rockfish are delivered from the EVOS impacted area. Observers placed aboard a sample of commercial vessels will quantify the magnitude and composition of discards. Test fishing will produce fisheries-independent stock composition data.

2. Relative, species-specific productivity will be estimated using: i) age composition of lightly exploited stocks; and ii) empirical relationships based on related biological characteristics.

3. Biological data from current and historical landings (ADFG fish ticket system) will be analyzed over time and area to describe temporal and spatial patterns in human use.

C. Schedule

Feb 95-Sep 95	Sample collection
Jan 95-Sep 95	Otolith reading
Mar 95-Jul 95	Data analysis
Aug 95-Sep 95	Report writing. An interim progress report will be available October 1, 1995.

D. Technical Support

Determination of stock composition relies upon rockfish otolith ageing by the ADFG ageing laboratory. ADFG biometrics staff will provide input into sampling strategies and direct stock structure modeling.

E. Location

The project will be conducted in Prince William Sound and the outer Kenai Peninsula. The public utilizing rockfish resources for commercial, recreational, or subsistence purposes, particularly Southcentral Alaska communities, will benefit from this project.

PROJECT IMPLEMENTATION

ADFG is ideally suited to implement this project. Having historically monitored the sport and commercial harvests in Prince William Sound and the outer Kenai Peninsula, ADFG staff are uniquely familiar with the rockfish fishing fleet characteristics and areas fished, currently process all rockfish harvest data and conduct limited annual surveys in the study area.

COORDINATION OF INTEGRATED RESEARCH EFFORT

An understanding of stock composition and rockfish productivity will contribute significantly to the Sound Ecosystem Assessment (SEA) Plan.

FY 95 BUDGET ($K)

Personnel	133.3
Travel	2.8
Contractual	35.1
Commodities	3.2
Equipment	25.7
Subtotal	200.1
Gen. Admin.	22.5
Total	222.6

Rockfish Restoration Objective

Project Number:	95112
Restoration Category:	General Restoration
Proposed By:	ADFG
Cost FY 95:	$53,700
Cost FY 96:	$0
Total Cost:	$53,700
Duration:	1 year
Geographic Area:	Prince William Sound, outer Kenai Peninsula
Injured Resource/Service:	Rockfish

INTRODUCTION

Rockfish include species in the genera *Sebastes* and *Sebastolobus*. Commercial rockfish harvests increased four-fold following the EVOS due to closures of the commercial salmon and shellfish fisheries. In addition, recreational rockfish harvests also increased. Both commercial and recreational rockfish harvests remain high. In addition, rockfish mortalities attributable to oil ingestion were observed immediately after the EVOS. Subsequent histopathological sampling indicated continuing population injury.

Because rockfish exhibit extreme longevity, slow growth, and late maturity, depressed populations recover very slowly. Due to concerns over the sustainability and yield from impacted rockfish resources and evidence of local depletions, regulations have been implemented since the EVOS to reduce commercial and sport fishing harvests. At the Department's request the Alaska Board of Fisheries adopted a management plan for North Gulf of Alaska commercial rockfish fisheries. This plan establishes seasonal and trip limits as well as bycatch provisions. In addition, bag and possession limits in area sport fisheries have been reduced. Even with these measures, the impacts and rebuilding of depleted rockfish populations are likely to continue through several human generations.

Information is available on rockfish relative abundance and species composition in the EVOS-impacted area. The Alaska Department of Fish and Game (ADFG) has attempted to increase the assessment of the rockfish resource in recent years. However, surveys, follow-up analyses, and a synthesis with existing EVOS data have suffered from a lack of funding. This project would synthesize existing data on rockfish. The goal is to develop a recovery objective and

make recommendations on whether monitoring or restoration activities (such as marine reserves/refuges) are needed to meet the defined objective.

NEED FOR THE PROJECT

The *Exxon Valdez* Oil Spill Trustee Council has acknowledged that rockfish is an injured resource and has an obligation to determine if the resource has recovered or is recovering. A recovery objective needs to be defined and a framework created under which the trustees can decide on subsequent monitoring or restoration activities. Rockfish populations suffered direct mortalities and sublethal effects from the oil spill. Indirect spill impacts included an increase in effort directed at groundfish resources in general and rockfish in particular as traditional fishing opportunities such as salmon, herring, and shellfish declined. Rockfish are an integral, resident component of the spill area ecosystem. The loss of rockfish resources through direct and indirect effects following the spill may alter energy transfer within the spill area. While ADFG has authority to curtail commercial and recreational fishing, that authority is dependent upon a meaningful and defensible biological justification.

Relative to many other marine species, rockfish exhibit extreme longevity (>50 yrs), slow growth, and late maturity (7-20 yrs). Many rockfish species also have localized distributions. These characteristics reflect the relatively low annual productivity of rockfish, making these species highly susceptible to overfishing. Once depressed, populations recover very slowly.

Rockfish are difficult to study because of their unique habitat and physiological characteristics. Despite the importance of rockfish to the ecosystem and the potential for long-term damage from overfishing, there have been few studies to directly assess rockfish resources in the spill area. Because commercial rockfish fisheries typically generate a relatively low economic value, rockfish have a low institutional priority. Although limited rockfish sampling has provided some biological data, this low priority has left much data unprocessed.

PROJECT DESIGN

A. Objectives

The goal of this project is to develop a recovery objective following the synthesis of existing rockfish data. Initial objectives of this study are to:

1. Describe biological characteristics of the rockfish resource. Using port sampling, fishery performance, and EVOS study data describe stock composition, relative mortality, growth, relative abundance, and relative recruitment.

2. Describe the stock status of the rockfish resource. Using survey and fishery performance data describe stock distribution, habitat preference, and potential level of disturbance for rockfish in the EVOS affected area.

3. Review and recommend recovery monitoring and restoration activities. Possibilities include habitat based assessment and marine reserves/refuges.

B. Methods

1. Species, sex, size, and age data collected from commercial and sport landings at ports and processors where rockfish have been delivered from the EVOS impacted area will be analyzed.

2. Relative species-specific productivity will be estimated using: i) age composition of lightly exploited stocks; and ii) empirical relationships based on related biological characteristics.

3. Biological data from current and historical landings (ADFG fish ticket system) will be analyzed over time and area to describe temporal and spatial patterns in human use.

4. An expert in rockfish biology will be contracted to review existing data and help define the level of damage, its possible causes, and restoration options

C. Schedule

Oct 94-Feb 95	Review literature and coalesce data
Oct 94-Dec 94	Otolith reading
Mar 95-Jul 95	Data analysis an interim progress report will be available October 1, 1995

D. Technical Support

Rockfish otoliths will be aged by the ADFG otolith laboratory in Juneau. ADFG biometrics staff in Anchorage will direct stock structure modeling. An expert on rockfish biology will be contracted to help direct the synthesis of existing commercial, sport, and EVOS data and develop conclusions on stock status, restoration objectives, and monitoring and restoration options

E. Location

The project will be conducted in Prince William Sound and the outer Kenai Peninsula. The public utilizing rockfish resources for commercial, recreational, or subsistence purposes, particularly Southcentral Alaska communities, will benefit from this project.

PROJECT IMPLEMENTATION

ADFG is ideally suited to implement this project. Having historically monitored the sport and commercial harvests in Prince William Sound and the outer Kenai Peninsula ADFG staff are uniquely familiar with the rockfish fishing fleet characteristics, areas historically fished, currently

process all rockfish harvest data and conduct limited annual surveys in the study area. Additional expertise will be contracted to help direct the synthesis of existing commercial, sport, and EVOS data and develop conclusions on stock status, restoration objectives, and monitoring and restoration options.

COORDINATION OF INTEGRATED RESEARCH EFFORT

An understanding of rockfish stock composition, distribution, and productivity will contribute significantly to the Sound Ecosystem Assessment (SEA) Plan. Data collected on rockfish distribution, habitat, or food habits from such SEA studies as *Salmon Predators* will be used. A thorough review of other marine studies funded by the EVOS will lead to a very efficient use of all rockfish data.

FY 95 BUDGET ($K)

Personnel	25.8
Travel	3.0
Contractual	15.0
Commodities	3.0
Equipment	2.0
Subtotal	48.8
Gen. Admin.	4.9
Total	53.7

Project 95113
SFOS 94-179

ENERGETICS OF INTERTIDAL FISH:

THE CONNECTION BETWEEN LOWER AND UPPER TROPHIC LEVELS

Project Leader:	W. E. Barber, Associate Professor School of Fisheries and Ocean Sciences University of Alaska Fairbanks Fairbanks, AK 99775-7220
Cost:	FY 95 - $140,284 FY 96 - $147,580 FY 97 - $108,688
Start-up/Completion:	1 January 1995 to 1 June 1997
Duration:	3.5 years
Geographic Area:	Prince William Sound and Cook Inlet
Contact:	W. E. Barber, Ph. D. School of Fisheries and Ocean Sciences University of Alaska Fairbanks Fairbanks, AK 99775-7220 (907) 474-7177; FAX 474-7204

Introduction:

The recent emphasis on understanding ecosystem processes to interpret the influenced of the Exxon Valdez oil spill on the numerous impacted species, and their recovery, has brought to the forefront the interaction between forage species and their predators. A number of the impacted birds and mammals prey not only on subtidal and pelagic organisms fishes but also those inhabiting the intertidal area. This is particularly true of the pigeon guillemot and river otter. The intertidal area bore the brunt of the spill, impacting plants, invertebrates, and fishes. To understand the influence of the spill on species such as these and their recovery, from an ecosystem perspective, intertidal fishes must be considered and incorporated into models developed. This study proposes to study the bioenergetic aspects of the three fish species inhabiting the intertidal area of Prince William Sound utilized by pigeon guillemot and river otter.

Objectives:

1. Determine the seasonal changes in energy content of the high cockscomb prickleback ((Anoplarchus purpurescens), the cresent gunnel (Pholis ornata), and the tidepool sculpin (Oligocottus maculosus).
2. Determine prey organisms of these three fish species.
3. Determine the energy content of major prey species of these three intertidal fish species.

Methods and Materials:

Energy content (kJ/g), percent water, total energy (kJ), will be determined for the major body components (gonads, body, gastrointestinal tract, and liver) will be determined. This will be done for four size groups of each species and four seasons. For the four seasons foods will be determined and for the major prey species energy content determined for each species. Samples will be dried and energy determined using a Parr adiabatic bomb calorimeter following standard methods.

Budget:	FY95	FY96	FY97
SALARIES	103.8	109.9	80.7
TRAVEL	6.6	6.6	5.3
CONTRACTUAL	2.5	2.5	3.2
COMMODITIES	4.0	4.0	1.4
EQUIPMENT	0.0	0.0	0.0
SUBTOTAL	116.9	122.9	90.6
ADMINISTRATIVE COSTS	23.4	24.7	18.1
TOTAL	140.3	147.6	108.7

Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers

Project Number:	95114
Restoration Category:	Research
Proposed By:	Prince William Sound Science Center
Lead Trustee Agency:	ADFG
Cost FY 95:	$145,100
Cost FY 96:	$60,700
Total Cost:	$205,800
Duration:	2 years
Geographic Area:	Western Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

Stable isotope ratios of carbon ($^{13}C/^{12}C$) can serve as effective tracers of energy supply in the study area due to conservative transfer of carbon isotope ratios between the lower tropic levels (primary producers such as eelgrass, invertebrates, and forage fishes, etc.) of Prince William Sound waters up to the top consumers. Isotope ratio analysis of harmed species, their prey and their predators can provide insight into both habitat usage and assist in quantifying amounts of food derived from various areas. Nitrogen stable isotope ratios ($^{15}N/^{14}N$), in turn, provide excellent definition of relative trophic level. The heavy isotope of nitrogen is enriched by about 0.34 % with each feeding process and thus can accurately indicate the relative trophic status of species within an ecosystem. The combined use of $^{15}N/^{14}N$ and $^{13}C/^{12}C$ measurements can be used to reconstruct food web structure. The data obtained from these measurements are unique in that they trace material actually assimilated and thus can be used for more accurate ecosystem modeling.

It can be postulated that natural stable isotope abundance of Prince William Sound (PWS) biota will shift because of changes in trophic level, food web structure, and primary producer in the context of species and community recovery following the Exxon Valdez Oil Spill (EVOS), thus providing an independent tool to verify, quantify and model ecosystem processes during ecosystem recovery and restoration. The tracer nature of the approach will enable the integration of ecosystem components. It will enable us to monitor both "top down" (predatory)

and "bottom up" shifts (food supply) during recovery and restoration of harmed species and habitats.

This project is part of an interdisciplinary effort focused on the food web dynamics of eelgrass beds in PWS. The study is providing an integrating function to projects focusing on several levels in the food chains and will employ the stable isotope ratios of carbon and nitrogen to trace trophic transfers of carbon and nitrogen between levels. One focus will concern building the data base regarding eelgrass communities whereas the remaining work will seek to build a comprehensive base of isotopic data for the PWS region. In cases where regional gradients in isotope ratios exist, it may also be possible to identify critical habitats used by marine biota.

This project is designed to supplement the on-going EVOS eelgrass community monitoring project that is under the direction of Stephen C. Jewett (UAF), the FY95 BPD is already submitted. The stable isotope analysis in this project is anticipated to provide that project an added dimension for use in collaborative data interpretation.

NEED FOR THE PROJECT

The eelgrass community is a significant habitat for the production of terrestrial and aquatic species harmed by EVOS. In addition to the flora, harmed species include epi- and infauna of eelgrass beds as well as transient terrestrial and aquatic organisms that use the habitat or feed there. The restoration strategy has been to allow the natural recruitment processes re-establish the eelgrass communities. However, the eelgrass and other intertidal to subtidal communities contain organisms that are recovering from EVOS as well as species that are not recovering. In a holistic sense, these communities are not at their pre-spill status. Thus, there is a need to assess the recovery of community structure within eelgrass communities. In particular, there is a need to compare epifauna (e.g. amphipods) in control and oiled areas because of their role as forage for higher trophic levels. The rebound and then return to damaged state by several community species, including amphipods, suggests that although populations may appear to temporally recover, the ecological balance in terms of interorganismic relationships has not. Thus techniques such as natural stable isotope abundance that reveal ecological relationships must supplement studies that focus on assessing population size and structure. This will enable an assessment of restoration not otherwise possible. This assessment could then lead to modifications or development of new restoration strategies based re-establishing normal ecological roles of different species.

A further benefit of this project is that it will provide the needed littoral isotopic signatures for use in conjunction with concurrent pelagic studies to assess the roles of different communities in the recovery of motile species, e.g herring and salmon. This project will also provide an isotopic signature database of forage biota for projects concerned with higher trophic levels (birds and mammals) enabling then to interpret their data.

PROJECT DESIGN

A. Objectives

Hypothesis 1. Carbon and nitrogen stable isotope ratios of biota from Prince William Sound can be used to identify major food sources to top trophic levels and to assign trophic positions to specific consumers of given age classes and habitat.

Hypothesis 2. Isotope ratios in consumers provide a means to validate conceptual food web structures, identify trophic variability by individuals within species, and to validate quantified energy flows in ecosystem models.

Specific objectives of this project are:

1. To determine the $^{15}N/^{14}N$ and $^{13}C/^{12}C$ of species collected from oiled and unoiled sites in the stratified sampling design specified in the proposal "Subtidal Monitoring: Eelgrass Communities", Principal Investigator Stephen C. Jewett. These paired site comparisons will be used to assess recovery from the EVOS by comparing food web structure as determined by stable isotope abundance in conjunction with the approach specified in the Jewett proposal.

2. Synthesize the data obtained in context with conceptual food webs to validate feeding models and expand to other isotope studies being conducted in PWS by Kline and others.

B. Methods

Because this project will be done in collaboration with Jewett, sampling will follow his strategy. Briefly, sampling will be conducted at four oiled and four control eelgrass sites. This will enable comparison of site effects and oil effects on community structure. Obtaining isotopic signatures of biota from several littoral sites will also be useful in synthesis of this projects results with those of projects form the adjacent pelagic habitats (PWS system investigations)

The methodology involved in the isotopic analyses and the interpretation of the data are well-established and documented in several publications resulting from prior work of the Principal Investigator. The UAF Stable Isotope Facility has three isotope ratio mass spectrometers including a new automated system which facilitates faster sample processing and allows more replication in small samples.

Field sampling protocols are well established and will be used. Predator isotopic data will be compared with values obtained from prey species in the same habitats. Where samples of prey species are missing or few, we will try to select proxy samples from the same area (zooplankton, benthos) which will enable a similar comparison. After the isotopic values are in hand, we will synthesize the data with past unpublished data and with other literature isotope ratio values to establish a trophic model.

C. Schedule

Field activities will take place during a two-week cruise in July 1995 as planned by Jewett. Preliminary sample preparation will take place during the cruise followed by laboratory preparation for mass spectrometry at the Prince William Sound Science Center. Mass spectrometric analysis will take place at the UAF stable isotope facility with completion anticipated in December, 1995. The completion of the draft final report is anticipated during February 1996.

D. Technical Support

Technical support (field logistics) is being provided for this project through the Jewett project. Additional support will come from the University of Alaska Stable Isotope facility: N. Haubenstock will receive prepared samples from Dr. Kline and will report the data to Dr. Kline.

E. Location

A total of 4 oiled (O) and 4 control (C) sites will be sampled per the Jewett proposal. The paired sites are as follows: Bay of Isles (O) / Drier Bay (C); Herring Bay (O) / Lower Herring Bay (C); Sleepy Bay (O)/ Moose Lips Bay (C); and Clammy bay (O)/ Puffin Bay (C). Analytical work will be carried out using the stable isotope facility at UAF. Sample preparation for stable isotope analysis and data interpretation will take place at the Prince William Sound Science Center.

PROJECT IMPLEMENTATION

This project is derived from the Jewett project that has been implemented by ADFG for the past three years.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will coordinate via Jewett with the monitoring of oil in subtidal (<20 m) sediments (conducted by NOAA). These projects have several sites in common. This project will also coordinate with other stable isotope projects in the EVOS studies.

FY 95 BUDGET ($K)

Personnel	3.0
Travel	0.0
Contractual	132.4
Commodities	0.0
Equipment	0.0
Subtotal	135.4
Gen. Admin.	9.7
Total	145.1

Project 95116

A. COVER PAGE

1. Project Title: Restoration of Intertidal Oiled Mussel Beds by Non-Destructive Manipulation/Flushing with PES-51®.

2. Project Leader: Mr. Stephen R. Rog

3. Lead Organization:
PES Services AK, Inc.
552 W. 58th, Unit E
Anchorage, AK 99518
Phone: (907) 562-8881
Fax: (907) 562-8883

4. Cost of Project: Cost Estimate - $453,186 for FY95

5. Project Startup/Completion Dates:
Startup: July, 1995
Completion: July, 1996

6. Project Duration: One (1) Year

7. Geographic Area: Chenega Island area

8. Contact Person:
Dennis C. Owens
PES Services, Inc.
P.O. Box 680488
San Antonio, TX 78268-0488
Phone: (210) 680-2950
Fax: (210) 523-5700

B. INTRODUCTION

This project will focus on restoration of the mussel beds in the Chenega area, and as a result contribute to the recovery of injured resources that use these mussels as a food source, e.g. harlequin ducks, sea otters and black oystercatchers. In addition, these mussels are an integral component of the subsistence of humans residing in the Prince William Sound area. These mussel beds were impacted by the 1989 Exxon Valdez oil spill. The Chenega area remains as one of the sites of the most persistent heavy and medium oil residue concentrations (1993 Shoreline Assessment sponsored by the Exxon Valdez Trustee Council). A team of companies and universities to be led by PES Services proposes to work with the Trustees Council and the Alaskan Department of Environmental Conservation (ADEC) on this project. The project will be conducted to demonstrate the efficacy of a non-destructive manipulation/flushing method using PES-51® to remove the oil found in mussel beds and to demonstrate that this method is not toxic to the mussels or other resident fauna. This project builds on the successful demonstration of PES-51® for the removal of persistent oil from a rocky shoreline in Prince William Sound as was funded by the Hazardous Substance Spill Technology Review Council (HSSTRC) in 1993. The shoreline project also demonstrated that there were no observable acute toxic effects from PES-51® on the mussels and other invertebrate fauna observed near the treatment site. It is reasonable to propose, therefore, that PES-51® application to oiled mussel beds will be effective while not being toxic to the mussels and other resident fauna.

Dense clusters of the blue mussel, *Mytilus edulis*, occur on rocky shores throughout the region impacted by the Exxon Valdez oil spill that began in March of 1989. Mussels secrete byssal threads which enable them to attach to the substrate. In addition to providing stability, the matrix of threads extending from a bed of mussels, forms an environment that offers shelter for a diverse mix of marine invertebrates. These other fauna find shelter from wind, waves and sunlight within the mussel threads.

It is documented that liquid oil persists in the sediments and organic materials that compose the mussel beds in the Chenega area (Piper,E. and Gibeaut,J.,1993). These oiled mussel beds offer the opportunity to evaluate the efficacy of new shoreline treatment technology, like PES-51®, to restore these beds and to establish baseline information for future oil spills. Currently, there is no established best method for removal of the oil from within oiled mussel beds. It is, therefore, important to take this opportunity to develop a method of effectively and efficiently removing the oil while not damaging the mussel bed.

C. NEED FOR THE PROJECT

This project is being undertaken to demonstrate the efficacy of a non-destructive/flushing methodology utilizing PES-51® to remove oil persisting in mussel beds in the Chenega Island area. The impact of these oiled mussel beds is evident from information provided in the "Invitation to Submit Restoration Projects for Fiscal Year 1995" in response to which this proposal is submitted:

> "Oil trapped in the sediments beneath certain mussel beds has degraded slowly and has retained toxic components since the spill. The protected beds are one of the few sources of unweathered oil remaining from the oil spill. This oil may be a route for continued exposure and contamination to higher trophic levels such as harlequin ducks that feed on the mussels."

This project will demonstrate that this new shoreline cleaning technology is a minimally intrusive manipulative technique that will remove oil from beneath oiled mussel beds and accelerate natural attenuation processes without harming the mussels and other resident fauna. Restoration of the mussel beds to their pristine condition will enable ADEC to determine whether removal of the persistent oil in the mussel beds is a critical factor in speeding up the recovery of harlequin ducks sea otters and black oystercatchers.

D. PROJECT DESIGN

1. **Objective**: To evaluate the effectiveness of a new shoreline cleaning technology, using PES-51®, to remove oil from an impacted mussel bed and to demonstrate the potential impact of this removal methodology on the mussels and the fauna residing in the nearshore/shoreline.

2. **Methods**: The overall design and performance of the project is shown in Table 1. The project site design will depend in part on the size of oiled mussel beds available for the project. The candidate mussel bed will be selected by the Trustees Council in conjunction with regulatory and recovery agencies, e.g. ADEC, NOAA, etc. If the area is relatively limited, the design will include two mussel bed areas; one oiled bed and another nearby that has no evidence of retained oil (control area). Each of these beds will be divided into three plots; one to be treated with the PES-51® methodology, one that will be treated, but without PES-51®, while the third is left untreated. These six plots will enable us to evaluate the efficacy of the PES-51® on oiled mussel beds as well as the potential for toxicity on mussels and other resident fauna in oiled and non-oiled beds. Measures will be undertaken to minimize the possibility of PES-51® migrating from treated plots to untreated ones. The second approach to be used, if the beds are large enough, will have a randomized block design and include test and control blocks. Choice between these two designs will be made during an initial visit by representatives of the project team and the Trustees Council. With either design, mussel bed, water column and lower and middle tidal zone sediment samples will be obtained for analyses prior to and after treatment with the PES-51® methodology.

Post treatment samples will be obtained at least at one and seven days with other sample times to be determined by the UAF and UCSC associate investigators. One day samples will be analyzed for the potential toxicity on mussels and other resident fauna, whereas the seven day sample will also be analyzed for impact on microbial populations. Subsequent samples are likely to be proposed for the last possible date that access is permitted to the site due to winter weather and then the following spring.

Mussel bed samples will be obtained from the proposed oiled and control areas using the NRDA methods and prepared for hydrocarbon and biological analyses. Hydrocarbon analyses will be conducted on these samples by the Zymax Envirotechnology, Inc. of San Luis Obispo, CA using gas chromatography/mass spectrometry techniques (EPA 8240/8270) to establish baseline levels present in these beds. Biological analyses of the mussels will be conducted by Dr. Highsmith at the UAF and will establish the pretreatment characteristics of the mussel beds in the oiled and control areas. Note that the project design also includes administration of PES-51® to control areas. This is necessary to fully analyze the potential impact of this methodology on mussel beds because: a) mussels and other resident fauna exposed to chronic oiling for four years may be highly susceptible to injury by the treatment, b) conversely, those organisms remaining may be extraordinarily hardy or resistant, and c) the other faunas may be different (samples collected during the initial visit may answer this question prior to the experiment). Additionally, biological analyses will include determination of potential toxicity of the PES-51® treatment on other aquatic life, i.e. the other resident fauna. This phase of the project will be conducted by Dr. Tjeerdema at UCSC. Potential impact of PES-51® treatment on total heterotrophs and hydrocarbon degrading microbes in the lower and middle intertidal zones will be determined by Dr. Braddock at UAF from water column and sediment samples.

3. **Schedule**: Timelines for all critical aspects of the project are also shown Table 1 with all times represented as month and year when the activity will be accomplished.

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Table 1: Restoration of Intertidal Oiled Mussel Beds - Project Methodology and Timelines

Activities	PES	UAF	Chenega Corp	UCSC	Foss	Time (mo/yr)
Project Lead	X					
Initial Visit - Project Site Design and Baseline Mussel Bed, Water Column and Sediment Samples	X	X	X		X	6/95
Project Site Preparation	X		X		X	7-8/95
Logistics and Support			X			
PES-51® Application	X		X			9/95
Obtain Post Treatment Mussel, Water and Sediment Samples	X	X				9-10/95, 9/96
Hydrocarbon Analyses	X					7-10/95, 9/96
Analyses of Mussel Bed Samples for Potential Toxicity of Mussels		X				7-10/95, 9/96
Analyses of Mussel Bed Samples for Potential Toxicity of Other Resident Fauna		X		X		7-10/95, 9/96
Microbial Analyses of Water Columns, and Lower and Middle Tidal Zone Sediment Samples		X				7-10/95, 9/96
Hydrocarbon Waste Collection and Disposal	X				X	10/96
Interim and Final Reports	X					11/95, 10/96

4. **Technical Support:** The selected mussel beds will be double boomed and contained prior to the PES-51® treatment. Sea water deluge and flush pumps, air compressors, recovered oil storage tank and equipment and supplies will be staged on a sixty (60) foot landing craft, moored adjacent to or "beached" at the treatment site. Crew support will be provided using a berthing vessel. Foss Environmental Services, Inc. will provide qualified spill response equipment and services including booms, pumps, etc.

Methodology to be employed in this project involves application of PES-51® using a modified version of the air knife, pneumo-hydrodynamic system used at Sleepy Bay in 1993 that was sponsored by HSSTRC. For mussel bed application, the air knives will be regulated for a low pressure fracturing (or dilation) so that PES-51®, via an aerosol infusion, can reduce the interfacial tensions and move through the vertical sections of the oiled mussel beds. During the PES-51® infusion, sea water will follow the route of the PES-51® induced subsurface pathway. In addition, sea water deluge and flushing (low pressure, large quantities) using 6 inch pumps and fire monitors, will be used to move the oil to the double boomed area for collection and recovery. Oil recovered during the project will be contained and collected for disposal in accordance with standard spill techniques, e.g. containment booms, skimmers and absorbents. This oil will be pumped

to the storage tank, excess water will be decanted and the volume of oil recorded. At the completion of the project, the recovered oil will be disposed of or recycled at a permitted facility, e.g. Alaska Pollution Control, Inc., in accordance with state and federal laws and guidelines. Application of PES-51®, operation of the flushing equipment, and recovery of the oil will be handled by Chenega Corporation.

Samples obtained from the mussel beds, water column and lower and middle tidal zone sediments will undergo biological and chemical analyses as described in Section D.2. The work will be performed by Zymax Envirotechnology, Inc. (hydrocarbon analyses), UAF (potential toxicity on mussels and impact on the microbial populations) and UCSC (potential toxicity on other resident fauna). Results of the analytical activities will be provided to PES for evaluation, coordination and archiving. Each associate investigator will generate interim and final reports that will be integrated into the overall project reports that will be developed by PES.

5. **Location:** As was stated earlier, the Chenega areas is known to have some of the most persistent, heavy- and medium oil residue concentrations. For this reason the Chenega area is proposed as the site for this project. Additionally, involvement of the Chenega Corporation throughout the project is likely to serve a secondary purpose, i.e. involving local residents in critical resource restoration activities (1993 Trustee Council sponsored Assessment Survey). ADEC and the National Oceanographic and Atmospheric Administration have surveyed and sampled mussels and sediments from these oiled sites. One of the locations monitored during this survey is proposed for the proposed project.

E. PROJECT IMPLEMENTATION

PES Services is proposed as the lead organization for this project. PES Services, Inc. is well qualified to lead a multidisciplinary team of companies and universities having led the effort that was sponsored by HSSTRC at Sleepy Bay in 1993. The only portion of the project that could be implemented through a competitive contract process is the logistics support of the environmental contractor services. Foss Environmental Services, Inc. is listed as the contractor of choice due to their expertise in oil spills and the use of PES-51® under these conditions. The UAF and UCSC have both established marine science programs dealing with highly specialized testing for marine toxicology of selected species found in the Prince William Sound area. Chenega Corporation is well qualified and experienced in conducting projects as the one described in this proposal having performed similar duties during the 1993 HSSTRC sponsored project. Zymax Envirotechnology, Inc. is recognized for its capabilities in the types of chemical analyses and conducted analyses for PES on previous projects.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

This project involves collaborative partnerships among three companies and two universities and will involve oversight by a number of state and federal agencies, e.g. ADEC and NOAA, as well as community advisory groups. Depending on the outcome of the competition for funding from the Trustee Council, collaborative efforts may be undertaken with other groups having projects with related objectives and activities.

G. PUBLIC PROCESS

PES Services will make every possible effort to participate in workshops, public meetings, document reviews, etc. that are needed to insure understanding of the objectives and results of the proposed project so as to fulfill the requirements of the Trustee Council. PES Services has taken an aggressive approach to publishing its research and has presented results of the 1993 HSSTRC sponsored project at several national and international oil spill conferences. National Geographic will carry an article about this project in the August, 1994 issue.

H. PERSONNEL QUALIFICATIONS

1. Mr. Steve R. Rog, VP of Oil Spill Response and Industrial Cleaning for PES Services AK, Inc., will be the Project Leader. Mr. Rog has twenty years experience as an environmental geologist, served on an Oil Spill Response Team as the Environmental Coordinator for Tesoro Alaska Petroleum Company; has an extensive working knowledge of the proposed application technology; has been at every major oil spill in 1994 representing PES Services; and also was the manager for the 1993 HSSTRC sponsored project.

2. Dr. Raymond Highsmith is to be an Associate Investigator on this project. He is a Professor at UAF and a lead investigator in the Institute Of Marine Science. He is recognized as a worldwide expert on bivalves found in Alaskan waters.

3. Dr. Ron Tjeerdema is to be an Associate Investigator on this project. He is an Associate Professor at UCSC and a researcher in the Institute of Marine Science and recognized as a worldwide expert on aquatic toxicity testing procedures and protocols. His research team has developed dispersant toxicity testing protocols that have been adopted as industry standards.

4. Dr. Joan Braddock is to be an Associate Investigator on this project. She is a Assistant Professor of Microbiology and is associated with the Institute for Arctic Biology at UAF and has extensive experience in studies of the impact of hydrocarbons on shoreline microbiology and was a participant in the 1993 HSSTRC sponsored project.

5. Mr. Dennis Owens, VP for R&D of PES Services, will be the Project Coordinator responsible for all contract matters relating to the sponsor and subcontracts to the team members. He has twenty years experience as a corrosion oilfield chemist and microbiologist and is one of the developers of PES-51®. Most recently, he was the technical project coordinator for the 1993 HSSTRC sponsored project.

6. Dr. William Alter III, Director of Research and Technology Development for PES Services, will be responsible for coordinating the analyses of data and for integrating the team's reports into those that will be delivered to the Trustees Council. He is an Environmental Physiologist with over 25 years experience in research and development for the Air Force and academia and most recently was a Space Grant Fellow for the National Aeronautics and Space Administration.

7. Gail Evanoff and Chuck Totemoff of the Chenega Corporation and will be responsible for organizing the work crews that will participate in this project. The Chenega Corporation participated in the 1993 HSSTRC sponsored project at Sleepy Bay.

I. BUDGET

The budget was developed on the basis of an initial visit to the Chenega area for selection of the field site, project site design and acquisition of baseline samples, and a proposed 10 day field effort that includes travel to/from project site and one weather day. The costs for efforts in the field by PES and its team members are estimates which are subject to revision after finalizing the field aspects in discussions with the Trustees Council, regulatory and recovery agencies. A more detailed description of the budget appears as an appendix.

1.	Personnel - PES Services, Inc. (only)	48,900
2.	Travel	6,300
3.	Contractual Services	
	a. UAF - Environmental Technology Laboratory	66,297

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	b. UCSC	95,940
	c. Chenega Corporation	31,800
	d. Foss Environmental Services	21,000
	e. Zymax Envirotechnology, Inc.	8,000
	f. Alaska Pollution Control, Inc.	2,000
	g. Videography services	7,500
4.	Commodities	0
5.	Equipment	122,750
6.	Capital Outlay	0
7.	General Administration	1,500
8.	Subtotal Direct	411,987
9.	Indirect (10% MTD)	41,199
10.	Total Estimated Cost	453,186

A PROPOSAL TO NOAA PROCUREMENT DIVISION AND
EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

EXXON VALDEZ OIL SPILL RESTORATION WORK

Response to Broad Agency Announcement 52ABNF400104

TITLE: Food Limitation on Recovery of Injured Marine Bird Populations

Principal Investigator:	William J. Sydeman
Co-Principal Investigator:	Nadav Nur
Lead Agency:	Point Reyes Bird Observatory Stinson Beach, CA 94970

Date: 30 June 1994

Total Cost of Project:	$275,815
Fiscal Year 1995:	$124,883
Requested Start Date/Completion Date:	January 1995/December 1996
Project Duration:	Two years
Geographic Area:	Central California
Contact Person:	William J. Sydeman
Address:	Point Reyes Bird Observatory 4990 Shoreline Highway Stinson Beach, CA 94970
Telephone No.	(415) 868-1221 FAX: 868-1946

Project 95119-BAA

INTRODUCTION: PROJECT NEED

In response to **NOAA BAA 52ABNF400104** we propose to investigate the role of food limitation on the recovery of injured marine wildlife resources, with a focus on marine birds of the family Alcidae. Alcids, the group of marine birds most seriously impacted by oil spills (c.f. Page et al. 1990, Piatt et al. 1990), include the Common Murre (Uria aalge), Pigeon Guillemot (Cepphus columba), Marbled Murrelet (Brachyramphus marmoratus), Rhinoceros Auklet (Cerorhinca moncerata) and Cassin's Auklet (Ptychramphus aleuticus). These species were killed or debilitated during the 1989 **Exxon Valdez** oil spill (Piatt et al. 1990), as well as other oil spills along the west coast of North America (e.g. Page et al. 1990).

An investigation of the relationship between forage availability, diet, and effects of diet on demographic factors is needed to explain marine bird population dynamics, forecast the growth and recovery of affected marine bird populations, and guide oil-spill related restoration options for marine birds. Predicting the growth potential and recovery time of affected populations and species requires information on the balance between recruitment rate and adult mortality, immigration and emigration characteristics of a population, and the availability of other, less affected stock to repopulate affected resources and populations (Burgman, Ferson, and Akackaya 1993). Many of these parameters are unknown for alcids (Hudson 1985), although some parameters have been recently estimated (e.g. Emslie, Sydeman, and Pyle 1992; Sydeman 1993; Nur 1993; Beissinger and Nur in prep.).

With extended periods of time, injured alcid populations may recover from catastrophic mortality associated with oil spills. However, the population recovery process may, in some cases, be enhanced with proactive restoration efforts. Restoration projects using decoys and playback of vocalizations (e.g. Podolsky and Kress 1989) have been proposed to restore Common Murre colonies affected by oil spills, such as the **Exxon Valdez**. However, restoration efforts of this type will meet with limited success if ecological resources, such as prey availability, are insufficient to sustain growing or recovering populations. The answers to basic ecological questions, e.g. how food controls or limits marine bird populations and the relationship between resource availability and critical population parameters (reproduction, survival, and recruitment), are thus required to predict the success of proposed restoration projects (see Birkhead and Furness 1985; Croxall and Rothery 1991; Cairns 1992).

Moreover, restoration of injured resources should be guided by knowledge of sensitive demographic traits. Yet, for most seabirds, the sensitivity of the intrinsic rate of population increase or the annual rate of population growth (lambda) to variation in specific demographic traits and/or variation in food supply has not been determined (Nur, Ford and Ainley 1994). Without this type of understanding, restoration may focus upon demographic parameters which have little or no effect on population growth.

To further our understanding of food limits on population growth and seabird demography, we propose a two part investigation involving (1) a retrospective analysis of alcid diet and at-sea foraging ecology in relation to demographic parameters, and (2) development and application of stochastic population models (Caswell 1989; Burgman, et al. 1993) to predict population recovery and estimate the sensitivity of population growth to specific demographic and prey availability parameters. The second part of the study includes application of findings and models developed to Alaskan alcid populations. The core of the proposed work exploits a unique 24-year time-series of alcid ecology, including year-round information on diet, age-specific diet composition, breeding ecology, and oceanic habitat use, collected by Point Reyes Bird Observatory (PRBO) on the Farallon Islands and in the Gulf of the Farallones in central California, 1971-1994 (see Table 1). In conjunction with

Project 95119-BAA

Table 1. Available PRBO data on diet composition, demographic parameters, and foraging ecology of 4 species of alcids in the Gulf of the Farallones, California. na=not available.

Parameter	Common Murre	Pigeon Guillemot	Cassin's Auklet	Rhinoceros Auklet
chick diet	1973-1994	1971-1994	1977-1994[1]	1987-1994
feeding rate	1973-1994	1988-1994	1977-1994	1987-1994
adult diet	1985-1988	na	1985-1988	na
offspring production	1972-1994	1971-1994	1969-1994	1986-1994
chick growth	na	1971-1994[1]	1970-1994[1]	1987-1994
adult condition index	na	na	1978-1994	1987-1994
adult survival	1985-1994	1979-1994	1978-1994	1986-1994
juvenile survival	1992-1994	1979-1994[1]	1978-1994[1]	1987-1994
population size/index	1972-1994	1971-1994	1971-1994	1971-1994
oceanic habitat use	1985-1994	1985-1994	1985-1994	1985-1994

[1] Annual data for these parameters are intermittent.

NOAA/NMFS and CDFG fish and zooplankton stock assessments, these data provide a powerful tool for relating resource availability and marine bird population dynamics.

STUDY DESIGN AND OBJECTIVES

We will investigate the hypothesis that food limits population growth, hence the recovery of injured marine bird populations, through its effects on demographic traits: growth, mortality, reproduction, and recruitment. Our principle goal is to determine the functional relationship between variation in food supplies and demographic parameters for the alcids: Common Murre, Pigeon Guillemot, Rhinoceros Auklet, and Cassin's Auklet. To accomplish this goal, we will:

(1) Investigate temporal (annual, seasonal, and inter-decadal) and spatial variation in the diet of alcids in central California,

(2) Analyze available demographic data (growth, reproduction, survival, and recruitment) for alcids of the Farallon Islands,

(3) Investigate and establish relationships between diet composition and demographic parameters for Farallon Island alcids,

(4) Evaluate the energetic value of different alcid prey using bomb calorimetry (of previously collected samples) and estimate annual prey consumption based on observations of feeding rates and diet composition of chicks,

(5) Develop stochastic population models for 4 species to predict population trajectories and growth,

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(6) Incorporate variation in food availability in population models and project population growth and recovery under varying scenarios of resource availability,

(7) Apply models developed in (5) and (6) to Alaskan populations, utilizing available demographic information (e.g., reproductive success), and

(8) Conduct sensitivity analyses on population growth to guide restoration activities in Alaska under varying scenarios of resource availability, diet composition, and demographic parameters.

In addition, the project will involve the integration of diet and demographic results with NOAA/NMFS fish and zooplankton stock assessments. NMFS, Tiburon Laboratory, has conducted standardized mid-water trawls each year from 1983 to the present on the availability of rockfish (Sebastes spp.) and krill (Euphausidae) in the Gulf of the Farallones (Adams 1993). Farallon Island alcids feed extensively on these prey throughout the year (Ainley and Boekelheide 1990). Thus, the NMFS data provides a unique opportunity to relate an independent measure of resource availability with alcid diet and demographic parameters. Finally, in conjunction with the NMFS cruises, we have conducted censuses of alcids at sea during the breeding and pre-breeding seasons. These data are critical to understanding the relationship between productivity and diet. Birds forage at different locations depending upon the type of prey sought. The distance between the colony and feeding locations varies, hence diet selection may influence feeding rates, chick growth and, ultimately, reproductive success. For this aspect of the project, we will map foraging locations using GIS software and correlate oceanic habitat characteristics with diet and demography. This effort will provide habitat-specific understandings of the relationship between ocean resources and alcid population dynamics.

PRODUCTS

Our investigation will provide the Trustee Council with a comprehensive ecological understanding of the importance of food limitation on the recovery of injured marine bird populations, with a focus on the group of birds most often injured by oil spills. The investigation will help to explain why marine bird resources have not recovered more rapidly following the **Exxon Valdez** oil spill and why, for some colonies, long-term problems persist. The importance of determining the relationship between ocean resources, diet and population dynamics cannot be understated; the successful restoration of affected marine bird populations is wholly dependent upon resource variability and its effect on alcid demography. These relationships have, in general, been inadequately studied. Thus, the project will contribute to the restoration of injured resources through an understanding of basic ecological relationships. Furthermore, our modeling efforts will predict population growth under realistic ecological constraints. Lastly, sensitivity analyses will provide information on which demographic traits strongly influence population growth and which have minimal effects. For example, given the longevity of alcids, we may discover that maximizing adult survival, rather than attempting to increase productivity is more important to the population recovery process. These analysis should guide future restoration programs. Overall, the project will help NOAA and other agencies prioritize management goals and restoration options, given ecological constraints associated with food resources.

PROJECT IMPLEMENTATION AND COORDINATION

PRBO will be the lead organization in the project; our qualifications are listed below. Because of the unique nature of the data available to us, we feel that competitive

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procurement process is not necessary. The project is collaborative with UC Davis, NOAA's NMFS, NSF's GLOBEC program (through James Quinn, UC Davis), USFWS Farallons National Wildlife Refuge, and California Department of Fish & Game.

PUBLIC PROCESS

In addition to public involvement through the usual channels appropriate to activities of the Exxon Valdez Oil Spill Trustee Council (e.g., review by the Public Advisory Group), results of the project will be presented at major scientific conferences to which the public is invited.

STATEMENT OF QUALIFICATIONS

PRBO and its key personnel (PI Sydeman, co-PI Nur; together with D. Ainley and L. Spear) are uniquely qualified to meet the goals of this research program. In addition, Dr. James Quinn (UC Davis) will make an important contribution to research efforts, especially in relation to analysis and modeling of spatial variation in prey distribution. PRBO biologists on the proposed project have over six decades of direct field experience with marine birds and have been involved with oil spill damage assessments in California and elsewhere in the world for the past 25 years. We have investigated and published upon many aspects of seabird ecology over the past decade, including over 20 peer-reviewed scientific contributions specifically concerning alcid demography, population dynamics, and food web interactions (curriculum vitae provided upon request).

William Sydeman is Director of Farallon Island Research at PRBO. He has published extensively on seabird demography including relationship to the environment. He is PI or co-PI on several relevant seabird projects currently being conducted on the Farallon Islands, including two for the Gulf of the Farallones National Marine Sanctuary and the California Department of Fish & Game (Oil Spill Response Program). The latter is a project investigating the long-term effects of chronic oiling on Common Murres of Central California and is being carried out with Nadav Nur and David Ainley, among others.

Nadav Nur is Theoretical Ecologist at PRBO. He has expertise in state-of-the-art analysis of demographic parameters and recently organized a workshop on this subject. He has carried out demographic modeling of Common Murres, Brandt's Cormorants, Western Gulls (this work done with David Ainley; see Nur et al. 1994) and Marbled Murrelets (Nur 1993), as well as terrestrial species, e.g., Osprey (Nur & Geupel 1994). Together with David Ainley he carried out a literature review of marine bird population recovery potential for the **Exxon Valdez** Restoration Working Group (Nur and Ainley 1992).

David Ainley is Director of Marine Research at PRBO. He has been working on prey diet of seabirds for decades, first at the Farallon Islands (summarized in Ainley & Boekelheide 1990), and more recently in the Pacific and the Antarctic (these results summarized in numerous scientific publications in peer-reviewed ecological journals). Since 1985 he has been collaborating with National Marine Fisheries Service regarding habitat characteristics of pelagic seabirds in the Gulf of the Farallones. Current work includes demography of endangered shearwaters on Kauai island (together with Nadav Nur).

Larry Spear is seabird biologist at PRBO. He has extensive experience with calorimetry analyses (see Spear 1993) and with studies of at-sea seabirds in the Gulf of the Farallones and elsewhere in the Pacific Ocean, conducted over the past 15 years. He has published 31 peer-reviewed articles on seabirds in scientific journals.

James Quinn is Professor of Environmental Studies at University of California, Davis. He has worked extensively on spatial modeling of planktonic populations in relation to

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oceanographic factors, work currently supported by the NSF GLOBEC program and Sea Grant. This work would contribute directly to the proposed project, as would the Geographic Information System (GIS) laboratory that Quinn has established at UC Davis.

PRBO has demonstrated its ability to successfully administer large contracts and grants in the past. The institution has administered over $2M in grants and contracts in the past 5 years.

LITERATURE CITED

Ainley, D.G. and R.J. Boekelheide (Eds). 1990. Seabirds of the Farallon Islands. Stanford University Press, Palo Alto.

Birkhead, T.R. and R.H. Furness. 1985. Regulation of seabird populations. In Behavioral Ecology (R.M. Sibly and E.H. Smith, Eds), Blackwell Press, Oxford.

Burgman, M.A., S. Ferson, and H.R. Akcakaya. 1993. Risk Assessment in Conservation Biology. Chapman and Hall, London.

Cairns, D.K. 1992. Population regulation of seabird colonies. In Current Ornithology, (D.M. Power, Ed). Plenum Press, New York.

Caswell, H. 1989. Matrix Population Models. Sinauer Press, New York.

Croxall, J.P. and P. Rothery. 1991. Population regulation of seabirds and implications for their demography and conservation. In Bird population Studies: Their Relevance to Conservation and Management. (C.M. Perrins, J.D. Lebreton, and G.M. Hirons, Eds), Oxford Univ. Press, Oxford.

Emslie, S.D., W.J. Sydeman, and P. Pyle. 1992. The importance of mate retention and experience on breeding success of the Cassin's Auklet (Ptychoramphus aleuticus). Behav. Ecol. 3:189-195.

Hudson, P.J. 1985. Population parameters for the Atlantic Alcidae. In The Atlantic Alcidae (D.N. Nettleship and T.R. Birkhead, Eds.). Academic Press, London.

Nur, N. 1993. Estimating demographic parameters of the Marbled Murrelet. Final Report to Marbled Murrelet Recovery Team, USFWS.

Nur, N., and D.G. Ainley. 1992. Comprehensive Review and Critical Synthesis of the Literature on Recovery of Marine Bird Populations from Environmental Perturbations. PRBO Report To Restoration & Planning Work Group, Contract COOP-91-039.

Nur, N., and G.R. Geupel. 1994. Analysis of 1993 Cantara Osprey surveys. Final Report to Calif. Department of Fish & Game.

Nur. N., R.G. Ford, and D.G. Ainley. 1994. Computer model of Farallon seabird populations. Final Report contract CX-8140-1-0019, NOAA, Gulf of the Farallones National Marine Sanctuary.

Page, G.W., H.R. Carter, and R.G. Ford. 1990. Numbers of seabirds killed or debilitated in the 1986 "Apex Houston" oil spill in central California. Studies in Avian Biology 14: 164-173.

Piatt, J. F., C. J. Lensink, W. Butler, M. Kendziorek, and D. R. Nysewander. 1990. Immediate impact of the "Exxon Valdez" oil spill on marine birds. Auk 107:387-397.

Podolsky, R.H. and S.W. Kress. 1989. Colony formation in Leach's Storm-Petrel. Auk 106:332-336.

Spear, L.B. 1993. Dynamics and effect of Western Gulls feeding in a colony of guillemots and Brandt's Cormorants. J. Animal Ecology 62:399-414.

Sydeman, W.J. 1993. Survival of Common Murres (Uria aalge on Southeast Farallo Island, California. Ornis Scand. 24:135-141.

Project 95119-BAA

BUDGET SUMMARY

			Total Project	Fiscal Year
1995				
1.	Personnel		175600.00	75600.00
	Wm. Sydeman	1600 Hours		
	D. Ainley	1200 Hours		
	N. Nur	1040 Hours		
	L. Spear	400 Hours		
	Other	1520 Hours		
	Benefits @ 15%		26340.00	11340.00
2.	Travel/Per Diem		12948.00	4316.00
3.	Contractual Services		3000.00	1500.00
4.	Commodities/Supplies, etc.		1000.00	500.00
5.	Equipment		4000.00	4000.00
6.	Capital Outlay		8500.00	8500.00
7.	General Administration		44427.00	19127.00
8.	Fixed Fee		.00	.00
		TOTAL:	275815.00	124883.00

BUDGET SUMMARY BY TASK

		Personnel	Total Hours
(A)	RETROSPECTIVE DATA ANALYSES:		
1.	Analysis of Annual, Seasonal and Spatial Diet Composition:	4 FTE	800.00
2.	Analysis of Demographic Parameters:	4 FTE	720.00
3.	Relationships Between Diet Composition and Demography, Growth and Condition:	5 FTE	720.00
4.	Consumption of Prey and Prey Bioenergetics:	5 FTE	720.00
5.	Ocean Habitat Use in Relation to Diet:	2 FTE	880.00
(B)	MODEL DEVELOPMENT AND SENSITIVITY ANALYSIS:		
1.	Compilation of published/unpublished Alaskan data	2 FTE	320.00
2.	Model development and application	2 FTE	480.00
(C)	SUMMARY, INTERPRETATION AND REPORT PREPARATION:	5 FTE	1120.00

Mapping Potential Nesting Habitat of the Marbled Murrelet in Prince William Sound Using Habitat Models Linked to Geographic Databases

Project Number:	95122
Restoration Category:	Habitat Protection
Proposed By:	USFS
Cost FY 95:	$169,200
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Marbled murrelet

INTRODUCTION

Marbled murrelets were injured by oil contamination from the *Exxon Valdez* oil spill. Between 9,500 and 14,000 marbled murrelets died from the direct effects of oiling. This estimated mortality represents approximately 10% of the present total population size within the spill area. Presently, there is no known evidence of population recovery within the spill area.

Habitat modifications (such as logging) both within and outside the spill area may pose additional threats to the area's marbled murrelet populations. Protection of nesting habitat areas through acquisition and stewardship may reduce the extent of future disturbance so that population recovery may proceed.

This study represents an extension of previous work conducted by the USFWS the USFS as Restoration Project 93051 Part B. These studies characterize the nesting habitat of marbled murrelets throughout the spill area. The currently proposed work would be an operational application of the conceptual and quantitative models described in DeVelice et al. (1994) and Kuletz et al. (1994). The models would be linked to geographic databases of vegetation and physical site characteristics in the identification of potential nesting habitat of the marbled murrelet in Prince William Sound. The map outputs from this project will provide a state-of-science means for evaluating habitat protection or acquisition options in reference to marbled murrelets (or other species whose potential habitat can be specified based on vegetation and landscape features).

NEED FOR THE PROJECT

Marbled murrelet populations in Prince William Sound are reportedly not yet recovering from the spill and from the pre-spill population decline. However, protection of habitat is thought to be an important strategy for assisting in population recovery. Using the best available scientific information, the proposed work would provide a digital map of potential nesting habitat of the marbled murrelet. Land protection/acquisition personnel could directly use this map product in selecting alternative sites with the greatest potential towards ensuring population recovery.

PROJECT DESIGN

A. Objectives

Potential habitat of the marbled murrelet in Prince William Sound would be mapped by linking models described in DeVelice et al. (1994) and Kuletz et al. (1994) to spatial databases of vegetation and physical site characteristics. To meet this objective, a spatial database of vegetation types based on satellite imagery would need to be completed as part of this project. A draft version of this digital map (developed by USGS EROS Alaska Field Office and USFS Forest Sciences Laboratory personnel, in cooperation with the Chugach National Forest) is currently available for Prince William Sound. This project would verify and refine this vegetation database.

B. Methods

DeVelice et al. (1994) and Kuletz et al. (1994) describe both conceptual and statistical models that relate marbled murrelet occurrences to vegetation and physical site attributes. For example, both reports highlight a preference of marbled murrelets for forested habitats, particularly older forests with numerous mossy platforms (potential nest sites) in the trees. Additionally, DeVelice et al indicates that marbled murrelet sightings increase with the proportion of coniferous forest in an area. Both reports show a higher occurrence of marbled murrelets in more sheltered landscape positions (e.g., heads of bays, aspects protected from major storms). Models described in these and other studies relating marbled murrelet occurrences to vegetation type and landscape features would be applied in queries of the digital vegetation type and digital elevation model databases. Ultimately, this process will result in a digital map of potential marbled murrelet habitat in Prince William Sound. The proposed steps involved in this process are as follows:

1. The Chugach National Forests draft digital vegetation type map (based on satellite imagery) must be verified and refined before the habitat models can be effectively applied. Existing survey data will be used for initial refinement. Currently, almost 800 detailed sample plots spanning the range of vegetation types are available in the Chugach National Forest vegetation ecology database for Prince William Sound. These plots, 40 randomly-located 1-km radius digital vegetation maps from Prince William Sound, and a digital vegetation map covering Naked, Storey, and Peak islands will be

the primary input to the initial supervised classification of the digital vegetation map. All of these plot and polygon coverages reside in digital databases on the Chugach National Forest.

2. The marble murrelet habitat models based on vegetation type and landscape features will be linked (via GIS technology) to the digital vegetation map and digital elevation model (basically, a computerized topographical map) covering Prince William Sound.

3. During the summer of 1995, field surveys throughout Prince William Sound will be conducted to fill in gaps in the database of vegetation and physical sites for use in verification and refinement of the digital vegetation type map. The survey crews will be directed to sites that, in the aggregate, represent the full range of vegetation and physical site combinations present within Prince William Sound (however, ice fields will not be surveyed). These sample sites will be complementary to those sites already in the Chugach National Forest databases. The vegetation type classification developed by DeVelice et al will be used in the identification of vegetation types at each verification site. The precise location of each site will be quantified using a geographical positioning system (GPS).

4. Use the data from the summer of 1995 for the supervised classification of the digital vegetation map of Prince William Sound. The marbled murrelet habitat models would then be reapplied to this database (and the digital elevation model) to produce a digital map of potential marbled murrelet habitat. Although the digital vegetation map will initially by applied towards mapping potential habitat of the marbled murrelet, the potential applications of the digital map are vast. Among these applications are: mapping potential habitat for brown bear; assessing biodiversity patterns at the landscape level; assessing the ecological representativeness of alternative networks of nature preserves.

C. Schedule

1994 October	Provide GIS/remote sensing analyst with vegetation plot and polygon data for initial verification of digital vegetation map based on satellite imagery
Nov.- Dec.	Revise vegetation map based on plot and polygon data
1995 January	Create models of marbled murrelet potential habitat that can be linked to the digital vegetation map and the digital elevation model
Feb.-April	Apply the models to the digital vegetation and elevation coverages and make initial assessments of their validity
March	Secure charter vessel for use in vegetation map verification and advertise for field personnel
April	Hire field personnel (two biotechnicians) prepare for field work (e.g., organize training for field crew; acquire maps and aerial photographs; order necessary equipment; generate sufficient copies of field forms)
May	Safety training vegetation/characterization training and identification of locations of field verification sites

June-Aug.	Prince William Sound vegetation map verification surveys
Sept.-Oct.	Data entry and refinement of digital vegetation map
Nov.-Dec.	Final analysis and report writing
Dec. 31	Final report submitted

D. Technical Support

This project will require 18.5 person months of effort. Ecological support will be provided by R.L. DeVelice (six months; Chugach NF) and C. Hubbard (two months; Chugach NF). Habitat capability modeling support will be provided by L. Suring (one month; Chugach NF). GIS/remote sensing analysis will provided by K. Winterberger (three months; Forest Sciences Laboratory). Field work will largely be accomplished by two biotechnicians (total of six months).

Computational, analytic, and data archiving support will be provided by the USDA Chugach National Forest and Forest Sciences Laboratory, and USGS EROS Alaska Field Office (including the extensive use of personal computers and GIS workstations that will be required).

E. Location

The study area includes all of Prince William Sound.

PROJECT IMPLEMENTATION

This project would be conducted by ecology and GIS personnel of the USFS, Chugach National Forest and Forest Sciences Laboratory, and USGS EROS Alaska Field Office. These personnel have been actively developing geographic databases of vegetation and physical site characteristics in Pws over the past eight years. Extensive ecological survey in the area has provided the personnel with unparalleled familiarity with the ecological characteristics present. This experience is necessary for efficient verification of the map products generated by this study. Additionally, Chugach National Forest personnel (in cooperation with the USFWS) have developed models relating vegetation and physical site characteristics to marbled murrelet occurrences in PWS ("Characterization of Upland Nesting Habitat of the Marbled Murrelet in the *Exxon Valdez* Oil Spill Area (Project 93051B)". The personnel involved in developing these models would be best qualified towards applying them operationally, as proposed.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be independent of other known restoration projects proposed for FY 1995.

FY 95 BUDGET ($K)

Personnel	83.5
Travel	1.5
Contractual	60.0
Commodities	4.5
Equipment	3.0
Subtotal	152.5
Gen. Admin.	16.7
Total	169.2

Project Number
95123

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
SUBSISTENCE RESTORATION PROJECT DESCRIPTION

Project Title: Native Village of Tatitlek Community Store
Project Leader: Tatitlek Village IRA Council
Lead Agency: Alaska Department of Community and Regional Affairs
Cost of Project: FY 95 $300.0
Start-up/Completion Dates: June 1, 1995 through November 1, 1995
Project Duration: Ongoing
Geographic Area: Native Village of Tatitlek
Contact Person:

Gary P. Kompkoff, President
Tatitlek Village IRA Council
P.O. Box 171
Tatitlek, Alaska 99677
Phone: (907) 325-2311
Fax: (907) 325-2298

#95127

INTRODUCTION

" The disruption in the lives of the people in the subsistence based villages was one of the most drastic and damaging of the entire oil spill. The effects are probably among the most lingering--and measurable of the spill".

The Exxon Valdez Oil Spill
Final Report, State of Alaska Response

For many generations, the residents of the Native Village of Tatitlek have been able to rely on the subsistence resources from the land and sea for their sustenence and lifestyles; for many generations the residents have been able to harvest adequate subsistence resources to provide for their families and elders. Because of the dramatic effects that the Exxon Valdez oil spill has had on subsistence resources, the availability of subsistence resources has declined continuously since March 24, 1989 to a point where Tatitlek residents are not able to sustain adequate harvest levels to fill the needs of their families and elders and are forced to rely, to a much higher degree, on "store bought" goods for their sustenence.

The residents of the Native Village of Tatitlek are very aware of the strain that the oil spill has put on the subsistence resources and proposes a community store to alleviate the continual decline of those resources. This project would provide an avenue for replacing resources no longer available in sufficient numbers to meet the needs of the residents of the Native Village of Tatitlek, and more importantly, will lessen the impact that continued subsistence harvests at the present level may have on the already depleted resource base, until it becomes feasible to resume pre-oil spill harvest levels.

NEED FOR THE PROJECT

Most subsistence resources were severely damaged as a result of the EVOS. Availability of subsistence resources in th spill impacted areas continue to decline much more noticeably with each passing yeat. The percentages of normal harvests for the last year (1993) were down drastically.

Harbor Seals	25% of normal harvest levels
Sea Lions	10% of normal harvest levels
Salmon	30% of normal harvest levels
Ducks	10% of normal harvest levels
Shellfish	20% of normal harvest levels
Herring	0% of normal harvest levels
Herring Spawn	0% of normal harvest levels

The community store would contribute greatly to the restoration of subsistence resources by providing an avenue for lessening the impacts that continued subsistence harvests may have on an already depleted resource base. Tatitlek residents are very sensitive to the status of the resources that have provided for their lifestyles for thousands of years and are aware that decreased harvest levels may be necessary in order for the resources to respond favorably. The EVOS also created a much greater awareness of Prince William Sound, making visitors to the village a much greater issue, the store would provide access to supplies for the visitors.

PROJECT DESIGN

I. Objectives

a) Develop a long-range business plan for the development of a small, rural general store that will ensure continued operational success.

b) Design and construct a building for utilization as a community store.

#95123

c) Develop, purchase and maintain an inventory suitable to the needs of the residents of Tatitlek.

d) Provide a community store capable of meeting the needs of visitors and guests.

e) Provide employment and educational opportunities for residents of Tatitlek.

II. Methods

a) A long rang business plan will be developed with assistance from recognized consulting firms specializing in small business development (primarily Community Enterprise Development Corporation), to ensure the long term operational success of the store. This plan will include construction, design, inventory development, and long term operational plans.

b) A new building will be constructed at a centralized location, on lands owned by the Tatitlek Village IRA Council.

c) An inventory list will be developed with input from willage residents and consultants.

d) Store Inventory goods will be shipped in conjuntion with Mariculture Project products in order to limit freight costs.

e) Local residents will be trained to operate the store in all aspects of business administration.

III. Schedule

June 1,1995	Develope contract with Community Enterprise Development Corporation to provide technical assistance for store design and inventory listing, Begin traing manager and employees in business administration.
July 1,1995	Complete store design, order building materials.
August,1995	Begin construction of store building, under store inventory.
October,1995	Complete store construction, recieve store inventory.
Nov. 1,1995	Open Native Village of Tatitlek Community Store to public for business.

IV. Technical Support

Community Enterprise Development Corporation, which has much experience and expertise in rural business development will provide technical assistance for the development of building design and inventory.

Alaska Department of Community & Regional Affairs will assist in development of grant agreement.

Alaska Department of Fish & Game, Subsistence will provide assistance in developing grant application and follow through.

V. Location

The Community Store will be constructed on a centralized location within the Native Village of Tatitlek on lands owned by the Tatitlek Village IRA Council and serve residents of Tatitlek, Ellamar and visitors and guests.

PROJECT IMPLEMENTATION

The Native Village of Tatitlek Community Store should be implemented by the Alaska Department of Community & Regional Affairs, in conjunction with the Alaska Department of Fish and Game, Subsistence Restoration Planning and Implementation Project which has been funded by the criminal settlement agreement.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project could be integrated with the Mariculture Enhancement Project that the Native Village of Tatitlek intends to submit for consideration under the Subsistence Restoration Planning and Implementation Project. Materials and supplies for both projects could be integrated very well to limit freight costs, which are a major expense for rural projects. Supplies for the Community Store could be shipped on the return trip of the vehicle which will be used for transporting mariculture products to market on the Alaska State Ferry System, which is to be constructed this year.

PUBLIC PROCESS

Public meetings by the Tatitlek Village IRA Council have been held periodically since 1990 addressing the restoration of subsistence resources. It has been determined by the residents and government of the Native Village of Tatitlek that the resources affected by the oil spill will not soon recover unless efforts are made to assist that recovery. Limiting harvests until it has been determined that it is safe to resume pre-oil spill harvest levels is an effort that would benefit the resources greatly, provided that the residents have an alternative means to provide for their sustenance.

PERSONNEL QUALIFICATIONS

The Tatitlek Village IRA Council has much experience in administering grant rpojects and has an excellent working relationship with the Departments of Community and Regional Affairs and Fish and Game Subsistence Division.

BUDGET ($K)

Store Construction:	
Materials	75.0
Freight	20.0
Labor	65.0
Store Equipment:	
Freezers	7.5
Coolers	7.5
Display Cases	5.0
Store Inventory	
Supplies	85.0
Freight	15.0
Consultants	
Fees	10.0
SUBTOTAL	**290.0**
General Administration	10.0
PROJECT TOTAL	**300.0**

Project Number

95124A

Project Title: Tatitlek Mariculture Development Project

Project Leader: Gary Kompkoff

Lead Agency: Tatitlek IRA Council

Cost of Project: FY 95 - $109.5K; FY 96 - $122.0K; FY 97 - $156.1

Project Start-up/Completion Dates: October, 1994 to September, 1997

Project Duration: 3 years

Geographic Area: Tatitlek, Prince William Sound

Contact Person: David Daisy, 3936 Westwood Drive, Anchorage, AK 99517; phone 243-8544, fax 243-1183

Introduction

This project is intended to provide a long term source of subsistence food and income for the residents of Tatitlek. It will provide a means for the villagers to maintain their traditional lifestyle in the face of increased and sometimes conflicting use of the area of the Chugach region. The project has already gone through feasibility testing. This funding is being sought to help the mariculture project through the development stage and achieve self sufficiency. The development stage will continue through the next three years and will consist of continued training of local mariculture workers, cost of operations and setting up the project management structure in the village.

Project Need

This project is needed to replace lost subsistence resources and economic opportunities and provide the village with a means to develop a local bivalve resource in a manner that provides some level of protection against future man-made disasters such as EVOS. The oil spill amply demonstrated how vulnerable the local marine resource is to disasters such as the oil spill. As well as being an efficient way of utilizing the local marine environment, the mariculture techniques that will be utilized in this project will allow steps to be taken to protect the shellfish that are under culture from the effects of disasters such as EVOS.

Project Design

Objectives:

By September 30, 1995 a village management structure will be in place that will provide total oversight and accountability for the mariculture project.
By September 30, 1996 the mariculture will be making a substantial contribution to the subsistence needs of the village.
By September 30, 1997 the Tatitlek Mariculture Project will become self sustaining through the sale of shellfish produced by the project.

Methods:

The project will continue under the guidance of a mariculture expert. A business development company will be contracted to set up the project management system in the village.

Schedule:

The project will operate year round. Site health certification will take place in early summer, PSP sampling will be on a weekly basis, product will be available for subsistence use and sale year round, activity reports will be submitted quarterly.

Technical Support:

Mariculture expert, lab analysis for certification and PSP samples.

Location:

The project will take place near the village of Tatitlek.

Project Implementation

The Tatitlek IRA Council will be primarily responsible for the project with assistance from the Chugach Regional Resources Commission (CRRC).

Personnel Qualifications

The Tatitlek IRA Council has been involved with the mariculture project since it began in 1991. CRRC has been providing administrative assistance. Jeff Hetrick of Alaska Aquafarms, Inc. will continue to provide training and technical guidance. Mr. Hetrick has extensive experience in mariculture development in Alaska.

Budget

This project will fund only a portion of the total mariculture budget. The following are those items from the budget that will be funded by this project,

Item	Estimated Cost		
	FY 95	FY 96	FY 97
Personnel	$59.5	$59.5	81.1
Contractual	$15.0	$15.0	$15.0
Comodities	$25.0	$37.5	$50.0
Administration	$10.0	$10.0	$10.0
Total	$ 109.5	$ 122.0	$ 156.1

Project Number
95124B

Project Title: Tatitlek Mariculture Development Project; Capital Outlay

Project Leader: Gary Kompkoff

Lead Agency: Tatitlek IRA Council

Cost of Project: FY 95 - $405.0K; FY 96 - 201.0K

Project Start-up/Completion Dates: November, 1994 to September, 1996

Project Duration: 2 years

Geographic Area: Tatitlek, Prince William Sound

Contact Person: David Daisy, 3936 Westwood Drive, Anchorage, AK 99517;
Phone 243-8544, fax 243-1183

Introduction

The village of Tatitlek has been engaged in a shellfish mariculture development project as a way of restoring and/or replacing lost shellfish subsistence and economic development opportunities near the village as a result of the Exxon Valdez oil spill. Shellfish resources in the oil spill-affected area suffered double jeopardy. First, the sheltered habitats that were most hospitable to shellfish were also most protected against Prince William Sound's natural cleansing action. Oil spill residues tend to persist in contaminated shellfish habitats. The National Oceanic and Atmospheric Administration estimated that oil could remain in sheltered, low energy areas for twenty years or longer. Regardless of the action taken to remove the oil from shellfish beds, it will be a long time before these shellfish could be considered fit to eat. Second, the tendency of shellfish to accumulate, concentrate and store toxic contaminants such as polycyclic aromatic hydrocarbons (PAHS) compounds this habitat damage.

Because of the possible shellfish contamination from the oil spill village confidence in the healthfulness of the local wild shellfish stocks has been badly eroded. This is why the Tatitlek village council chose to undertake the mariculture development project. Mariculture is a feasible and cost effective means to conserve, repair and enhance the natural productivity of the natural resource base.

The project was initiated in 1991 and has now reached the point where a major capital outlay is needed to enable it to become self sufficient.

Project Need

This project will provide a certified clean bivalve resource on a self sustaining basis that can meet local subsistence needs as well as provide an economic base for the village. The local marine environment, as well as being the primary source for subsistence foods, offers one of the very few opportunities available to Tatitlek for economic development. EVOS amply demonstrated how vulnerable the marine environment is to disasters such as an oil spill. Unlike the wild bivalve resource, steps can be taken with shellfish raised under mariculture to protect them should another disaster such as EVOS ever occur.

Project Design

Objectives:

By September 30, 1995 the concrete foundation and floor for the processing building will be installed and the prefabed building itself put on order.
By September 30, 1995 the shellfish holding facility will be completed.
By September 30, 1995 the mariculture workboat will be purchased.
By September 30, 1995 the mariculture transport truck will be purchased.
By August 31, 1996 the processing building will be completely set up and all processing equipment purchased and installed.

Methods:
The processing building will be professionally designed and construction overseen by a reputable contractor. Workboat, transport truck and processing equipment specifications have already been developed.

Technical Support:
The project will require engineering, construction and mariculture expertise.

Location:
The project will take place in the village of Tatitlek.

Project Implementation

The Tatitlek IRA Council will implement project. The council will have oversight over all engineering, building and construction contracts and equipment ordering.

Personnel Qualifications

The Tatitlek IRA Council has extensive experience in involvement and oversight of capital projects conducted in their village.

Budget

#95124B

The budget will consist entirely of capital outlay. The following is a list of the separate pieces that make up the capital budget with an estimated cost for each by fiscal year

Item	Estimated Cost FY 95	FY 96
Holding Facility	$122.0	$0.0
Processing Building	$185.0	$144.0
Processing Equipment	$0.0	$57.0
Workboat	$53.0	$0.0
Transport Truck	$45.0	$0.0
Totals	$ 405.0	$ 201.0

Project Number
95125

EXXON VALDEZ OIL SPILL PROJECT PROPOSAL

Title:	Tatitlek Sockeye Salmon Release Program
Project Leaders:	Gary Kompkoff
Agency:	Tatitlek Traditional Council Alaska Department of Fish and Game Prince William Sound Aquaculture Corporation
Cost of Project:	$39,000 (FY95)
Dates of Project	1 October 1994 to 30 September 1995
Project Area:	Prince William Sound, Tatitlek vicinity
Contact Person:	Gary Kompkoff, President Tatitlek Village IRA Council P.O. Box 171 Tatitlek, Alaska 99677 (907) 325-2298

B. **Introduction**

Subsistence, as well as commercial and sport fisheries were drastically disrupted by the *Exxon Valdez* Oil Spill. Traditional usage of fish and fishing grounds by residents of the Village of Tatitlek was greatly reduced. The Tatitlek Sockeye Salmon Release Project will assist in the restoration for lost subsistence fishing opportunities and establish alternative subsistence fishing opportunities.

C. **Needs for the Project**

Many subsistence resources were impacted by the *EVOS* and Tatitlek residents have been forced to substitute commercially obtained processed foods for their traditional subsistence food resources. Subsistence uses have not returned to pre-spill levels and will not until subsistence resources return to pre-spill levels. In addition, resources will have to appear to be free of tainting by hydrocarbons. This project is designed to provide sockeye salmon for substitution for lost subsistence resources, until those resources reach pre-spill levels. The project will use Tatitlek Village laborers to the maximum extent possible.

The project will provide for the restoration and improvement of subsistence salmon harvests that were disrupted as a direct result of the *Exxon Valdez* Oil Spill.

D. **Project Design**

1. **Objectives**

Enhance sockeye salmon stocks in the vicinity of Tatitlek to provide subsistence foods needed for maintenance of the Villagers subsistence life style. The goal is to enhance subsistence resources by permitted releases of sockeye salmon at designated locations near the Village of Tatitlek in northeastern Prince William Sound. The objective would be a harvest of approximately 2000 adult sockeye salmon.

2. **Methods**

a. Sockeye salmon eggs will be taken from an ADF&G approved site. The incubation of the eggs and raising to smolt stage will occur at a salmon hatchery in Prince William Sound . Possible stocks would be Eyak Lake stock, or possibly one close to the Village.

b. Smolts would be transported by boat to a permitted site for remote release.

c. Smolts will be held and fed in net pens for approximately two weeks before releasing to improve survival rates and provide imprinting to the designated site.

d. Adults will be harvested for subsistence use in a terminal fishery designated for the village of Tatitlek.

3. **Schedule**

Date	Action
Jan 1995	Plans are reviewed by the NEPA Process.
Feb. 1995	Plans reviewed by the Prince William Sound Planning Team. and run through the Fish Transport Permit process. Compliance with the Alaska Genetics policy will also occur at this time.
June 1995	Sockeye salmon smolt transported, pen fed and released.
June 1996	First adult "jack" returns of sockeye salmon.
June 1997	First complete complement of all sockeye salmon age classes return to remote release site.

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4. **Technical Support**
The project will require support from the Alaska Department of Fish and Game, Commercial Fish Development and Enhancement Division, as well as the Prince William Sound Aquaculture Division.

5. **Location**
Northeastern Prince William Sound, around the Village of Tatitlek.

E. Project Implementation

ADF&G will evaluate candidate remote release sites for the sockeye salmon. They will determine the appropriateness of the candidate sites. It is expected that the Village of Tatitlek will be employed for the work at the net pen remote release sites. Private non-profit corporations will provide the hatchery service.

F. Coordination of Integrated Research

This project will be coordinated with other 1995 salmon and subsistence restoration projects.

G. Public Process

This project will be reviewed through the NEPA process, the Prince William Sound Regional Planning Team, and the Alaska Department of Fish and Game fish transport permitting process.

H. Personnel Qualifications

Area and regional ADF&G biologists with many years of fish culture experience will provide the technical support.

I. Budget ($K)

Personnel	2.5
Travel	0.0
Contractural	21.5
Commodities	0.0
Equipment	0.0
Capital Outlay	10.0
SUB-TOTAL	34.0
General Administration	3.0
NEPA Compliance	2.0
Total	39.0

Project Number
95127

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
SUBSISTENCE RESTORATION PROJECT DESCRIPTION

Project Title: Tatitlek Coho Salmon Release Program
Project Leader: Tatitlek Village IRA Council
Lead Agency: Alaska Department of Fish & Game
Cost of Project: FY 95 $39.0
Start-Up/ Completion Dates: January, 1995 - June 1997
Project Duration: Ongoing
Geographic Area: Prince William Sound, Tatitlek Narrows
Contact Person: Gary P. Kompkoff, President
Tatitlek Village IRA Council
P.O. Box 171
Tatitlek, AK. 99677
Phone: (907) 325-2311
Fax: (907) 325-2298

#95127

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
RESTORATION PROJECT DESCRIPTION

Project Title: Tatitlek Coho Salmon Release Program

B. INTRODUCTION

Subsistence as well as commercial and sport fisheries were severely disrupted by the oil spill. This project is intended to enhance subsistence resources by permitted releases of coho salmon at designated locations near the Native Village of Tatitlek in order to provide a long term subsistence resource for the residents of Tatitlek. Valdez Fisheries Development Corporation presently maintains an enhancement project near the Village of Tatitlek, at Boulder Bay. This project would ensure the continuation of that project.

C. NEED FOR THE PROJECT

Subsistence harvests of all salmon resources have declined considerably since the oil spill, and continue to be affected by it. This project would enhance the recovery of the salmon resources and provide a means for lessening the impacts of continued harvests on resources affected by the spill.

D. PROJECT DESIGN

I. Objectives:

-provide for the continued production of 50,000 coho salmon smolt at the Solomon Gulch Hatchery in Valdez for transport and release near the Native Village of Tatitlek (Boulder Bay).
-hold and feed coho salmon smolt at net pens at the release site for two weeks prior to release.
-harvest approximately 2,000 coho salmon annually upon their return to imprinting site.

II. Methods:

-Coho salmon will be taken from an ADF&G approved site for incubation and care and raised to smolt stage at the Solomon Gulch Hatchery in Valdez
-Smolt will be transported by boat in designated imprinting sites
-Smolt will be held and fed at net pens for approximately two weeks before releasing to improve survival rates and imprinting.

III. Schedule:

January 1995	Plans reviewed by the NEPA Process, salmon hatcheries
June, 1995	Eggs taken from salmon near the Native Village of Tatitlek
June, 1995	First salmon smolt transported, penned, fed and released
June, 1996	First adult salmon returns of coho salmon
June, 1997	First complete complement of all coho salmon age groups.

Each year smolts will he released in late May or early June.

IV. Technical Support:

Utilization of experience and technical support of Alaska Department of Fish & Fame is necessary for this project. Valdez Fisheries Development Corporation expertise will also be utilized.

V. Location:

The project will occur near the Native Village of Tatitlek. Salmon will be raised to smolt stage at the Solomon Gulch Hatchery at Valdez and released, after imprinting at Boulder Bay.

E. PROJECT IMPLEMENTATION

Valdez Fisheries Development Corporation, who have extensive experience in salmon enhancement activities, will continue their present enhancement of coho salmon near the village. ADF&G expertise will also be utilized.

F. COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is intended to provide funds for the continuance of a salmon enhancement project presently undertaken by Valdez Fisheries Development Corporation and could be accomplished in conjunction with a Sockeye Salmon Release Project being proposed by the Tatitlek Village IRA Council.

G. PUBLIC PROCESS

Public meeting in the Native Village of Tatitlek have been held periodically by the Tatitlek Village IRA Council addressing the prioritizing of restoration work.

H. PERSONAL QUALIFICATIONS

Valdez Fisheries Development Corporation personnel leave much experience and expertise in this field, they would work in cooperation with ADF&G personnel in accomplishing the goals of this project.

#95127

I. Budget ($K)

ADF&G

Personnel	$2.5
Travel	0.0
Contractual	21.5
Capital Outlay	10.0
SUB-TOTAL	**34.0**
Gen. Administration	3.0
NEPA Compliance	2.0
PROJECT TOTAL	$39.0

Project Number
95128

Project Title: Teaching Subsistence Practices and Values

Project Leaders: Martha Vlasoff and Gary Kompkoff

Lead Agency: Subsistence Divisions of ADF&G and NPS.

Cost of Project: FY 95 $69,000 FY 96 $52,000 FY 97 $52,000

Start/Completion Dates: 10/95 - 9/98

Project Duration: Three Years

Geographic Area: Tatitlek and environs

Contact Person:

Don Callaway
National Park Service, Subsistence Division
2525 Gambell, Suite 102
Anchorage, AK
(907) 257-2408

B. Introduction -Project Overview:

Many of the harvest areas used by residents of Tatitlek for subsistence were impacted by the Exxon Valdez oil spill. As documented by the Alaska Department of Fish and Game, Division of Subsistence subsistence harvests in Tatitlek declined from 652 pounds per capita between April 1988 and March 1989 to 207 pounds per capita between April 1989 and March 1990, 68.3 percent decline; the largest decline of any of the impacted communities. Five years after the spill, harvests have rebounded somewhat, but subsistence users in Tatitlek continue to report the scarcity of some resources and a distrust of the wholesomeness of resources in the oiled areas. As a result of the interruption of subsistence activities by the EVOS, there has been less opportunity to teach subsistence skills to young people in Tatitlek.

This project will provide funding for a spirit camp where young people from the community of Tatitlek will learn how to harvest, prepare and distribute a variety subsistence resources. Elders and other experienced individuals from the community will guide these activities. Young people will learn the practical aspects of harvesting, be introduced to the preparation and taste of traditional resources. They will also learn the spiritual, ethical and cultural importance of these resources for their community. The camp will be established in Galena Bay, which was not oiled in the EVOS, on land owned by the Tatitlek Corporation.

The camp will help restore a subsistence service currently unavailable in the community. It will provide a continuity in subsistence harvesting activities until the resources can be reestablished and confidence in their safety restored in the traditional harvest areas which were oiled.

C. Need for the Project:

Subsistence resources, and the activities associated with the harvest of these resources, provide more than food. Participation in family and community subsistence activities helps to teach young people basic cultural values. These activities define and establish the sense of family and community. It is through such activities that a person learns to identify, harvest, efficiently process and prepare resources.

The distribution of these resources establishes and promotes the basic ethical values in a culture, including generosity, respect for the knowledge and guidance of elders, self-esteem. No other set of activities provide a similar moral foundation for continuity between generations.

Food preferences are the most conservative behaviors in any culture. The unique preparation and special taste of foods encountered by children as they grow up stays with them forever. Years later the taste and smell of certain foods evoke memories of family and belonging.

The interruption of these harvest activities, to the service provided by subsistence resources, is key to the restoration concerns elicited in Tatitlek, Chenega Bay, Port Graham and other small Native communities affected by the Exxon Valdez Oil Spill.

D. Project Design:

1. Objectives:

To establish a camp site in Galena Bay, and provide training and experience in subsistence activities for youth of Tatitlek

2. Methods:

A group of locally hired workers from Tatitlek will clear the campsite and construct tent platforms as well as cooking and sanitation facilities. Tents, skiffs, fuel and other supplies will be purchased. The Tatitlek Village IRA Council will select and hire local elders and other experienced individuals to provide guidance and training in subsistence harvest activities. Camp support personnel will also be hired locally. The support personnel will be expected to document the educational program conducted at the camp, so it may be evaluated as an model for other such programs. It will be necessary to contract a vessel to transport the participants to the camp. Skiffs will be needed to travel to beaches within Galena Bay for harvest activities.

3. Schedule:

Four to six camp sessions of approximately two weeks each will be conducted during the appropriate seasons for harvest activities.

4. Technical Support:

Assistance may be required from various state and federal agencies to identify and obtain any permits necessary to establish and operate the camp.

5. Location:

The proposed site of the camp will be in Galena Bay, on land owned by the Tatitlek Corporation. The use of the land for this purpose will be contributed by the corporation.

E. Project Implementation:

The project should be implemented through a cooperative agreement between the Tatitlek Village IRA Council, the National Park Service (NPS) with a subsidiary cooperative agreement between the NPS and the Subsistence Division of the ADF&G. Section 809 under Title VIII of ANILCA empowers the Secretary to enter into cooperative agreements with other Federal agencies, the State, Native Corporations and other persons and organizations to oeffectuate the purposes and policies of this title".

F. Coordination of Integrated Research Effort.

This project will reinforce the efforts of the Subsistence Foods Testing Project (95279) in restoring subsistence services impacted by the EVOS. It will also further some of the goals of the Elder/Youth conference proposed by the Division of Subsistence of ADF&G and the impacted communities, by promoting communication between the generations. This project may also help the recovery of some resources in the oiled areas, by redirecting some harvest activities to an unoiled area.

G. Public Process:

The Subsistence Restoration Planning and Implementation Project composed of state representatives from the Subsistence Division of ADF&G and the Municipal and Regional Assistance Division of DCRA, along with representatives of the Forest Service and NPS have met in public meeting with the community of Tatitlek to solicit their recommendations for oil spill restoration projects. This project description is a product of that public meeting. The public at large will have an opportunity to comment during the public process associated with dissemination of FY 95 Draft Work Plan.

H. Personnel Qualifications:

Federal and state participants in the planned cooperative agreement have all had extensive experience in subsistence related research and regulatory programs. In addition both entities have conducted and monitored numerous cooperative agreements. Who knows better the values and activities associated with Tatitlek subsistence harvests than the members of the community themselves?

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I. Budget

PERSONNEL	35.0
TRAVEL	1.5
CONTRACTUAL	14.0
COMMODITIES	4.5
EQUIPMENT	0
CAPITAL OUTLAYS	9.0
GENERAL ADMINISTRATION	5.0
TOTAL	**69.0**

Project Number
95129

A. EXXON VALDEZ OIL SPILL PROJECT DESCRIPTION

1. Project Title: Tatitlek Fish and Game Processing Center/Smokery
2. Project Leader: Gary Kompkoff, President, Tatitlek I.R.A. Council
3. Lead Agency: Alaska Department of Fish & Game
4. Cost: $515,500
5. Project Start Up/Completion dates: Spring 1994 - 2000
6. Project Duration: Facility built in increments
7. Location: Tatitlek, AK
8. Contact Person: Gary Kompkoff, Tatitlek I.R.A. Council, PO BOX 171 Tatitlek, AK 99677 ph. (907) 325-2311

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B. Introduction: Tatitlek proposes to build a fish and game processing/storage/smokery facility. The purpose of this center will be to enhance the injured services of participation in subsistence activities and increase the amount of subsistence food available to the community while providing year-round employment for Tatitlek residents.

C. Need for the Project: Tatitlek's traditional subsistence harvests have not yet recovered to the pre-1989 oil spill level. Subsistence activities take more time than they did before the spill because residents have to travel farther and wait longer to find subsistence resources. The residents have also had to use fish to compensate for the decline in shellfish harvesting, which showed a more serious decline than salmon. As an example from Chenega Bay, a subsistence community similarly impacted by the spill, in 1984/85, fish represented only 29 percent of the total harvest; in 1985/86 fish represented 38 percent of the harvest, but in 1991, fish made up 74 percent of the harvest (AK Dept. of Fish and Game Household Survey.)

A processing center will permit residents to better process the resources they are still able to harvest. An improved storage facility/freezer will improve the quality of stored resources. The commercial part of this facility would also replace unrecovered subsistence activity with economic development.

D. Project Design:

1. Objectives: The community will be able to clean, process, and store their subsistence food more efficiently than they are currently able. Operating and maintenance costs of the facility will be paid through the sale of smoked oysters and salmon.

2. Method: Tatitlek IRA council will select an architecture/engineering firm to design the facility this Fall. Construction will begin in Spring of 1995. A contractor will also be selected using a bid type process. The council will hire someone to operate the facility. Once a year a technician from a refrigeration service will come to Tatitlek to check the facility and do preventative maintenance.

The design will be complete by early spring 1995 and will be submitted for public review. Construction will begin later that season. Local hire will be encouraged. After construction, the

council will oversee the operation of the facility. The council plans to start out the project on small scale with basic equipment, then further develop the facility as they establish its successfully and find other sources of funding. The council will hire a staff to operate, maintain and monitor the facility.

A marketing consultant will assist the council in selling the oysters. If the state ferry stops at Tatitlek, which is a strong possibility as an oil spill response/ferry dock is scheduled to be built by the Dept. of Transportation in Fall 1994, the fish and oysters will be sold to tourists.

Technical support will be available from the equipment supplier and the council will contract with a local refrigeration specialist to do yearly inspections and preventative maintenance as well as repairs as the need occurs.

The project will be located in Tatitlek, AK at the staging area of the ferry/oil spill response dock which will be built in the Fall of 1994.

E. Project Implementation: The village council will manage the construction and operation of the facility. They will hire staff to clean the facility, monitor the freezer temperature and check that sanitation regulations are followed. They will also contract with a refrigeration services specialist for preventative and emergency maintenance.

F. Coordination of Integrated Research Effort: This project has the potential to also meet the needs of the mariculture project which is submitted for FY 95. Currently preparation of oysters is done in a tiny, windowless trailer with no equipment and there is no facility in the community to smoke them for commercial use. This project also integrates with the boat project which will hopefully increase the number of fish and game which needs to be processed.

G. Public Process: The idea for this facility was presented at a public meeting held June 15, 1994 in Tatitlek. The council will ask for ideas from the community on what amenities they would use in the facility. These suggestions would go to the designer.

H. Personnel Qualifications: Gary Kompkoff has been president of the Tatitlek Village IRA council for 15 years and works for the council as supervisor of capital projects. He is chair of the board of

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directors for the North Pacific Rim Housing Authority He also fishes commercially and for subsistence.

I. Budget: Detailed information for a complete budget is not available at this time. An overall figure of $515,500 for the construction of the facility and one year's operations and maintenance was based on the cost of a fish processing and storage facility in Levelock, Alaska. Cost estimates are as follows:

1. Personnel	$109,000
2. Travel	15,500
3. Contractual Services	25,000
4. Commodities	1,000
5. Equipment	100,000
6. Capital Outlay	200,000
7. General Administration	50,000
8. Parts, repairs, etc	15,000
TOTAL	$515,500

Project Number
95130

Healing Center
FY 95 Project Proposal

A. Cover Page

1. Long range planning of and training for a Healing Center

2. Project Directors : Martha Vlasoff / PJ Overholtzer

3 Lead Agency : Chugachmiut and Copper Mountain Foundation

4 Project Cost: FY 95- $106.1; FY 96-$120.8 FY 97 $100.7

5. Project Start up: December, 1994; Continuing

6. Project Duration: 5 years (estimated)

7. Geographic Areas: Oil Spill Area Wide

8. Contact Persons: Martha Vlasoff
Copper Mountain Foundation
Box 6
Cordova, Alaska, 99574
424-3777

Sandy Stone
Advocates for Victims of Violence
Box 524
Valdez, Alaska, 99686
835-2980

PJ Overholtzer
Chugachmiut
4201 Tudor Centre Drive
Anchorage Alaska 99508
562-4155

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Mental Health Center
FY 95 Project

B. Introduction

The Exxon Valdez Oil Spill in 1989 was a major disruption to the way of life for the people living in the oil spill affected area not only in a physical realm but also in the emotional and psychological realm. Many mental health programs were established shortly after the spill to try to compensate the great loss that was felt then. But little attention
has been paid to mental health issues in light of the budget cuts of recent years which have left a serious gap in the services urgently needed to help local people cope with what is now appearing to be an ongoing psychological struggle which is partially due to the continued lack of sufficient subsistence resources and doubts whether the food is really safe to eat. Also there is a financial burden to all the communities because the commercial fishing resources are no longer able to support the fleet in Tatitlek, Valdez, Chenega or Cordova and Pt Graham, Nanwalek and the villages around Kodiak .This brings about an increase in dysfunctional behaviors including increased abuse of drugs and alcohol with the accompanying emotional results which usually manifest themselves as spouse abuse, child abuse, depression, compulsive behavior, and lead to an increased incidence of divorce , suicide., and other destructive activities.

C. Need for Project

What is needed for the area is the development of a Healing Center which will be based on the cultural values of the Native people and would provide trainings in and access to counseling to Native people and non-Native people on delayed grief, post traumatic stress associated with the loss of their lifestyle since the oil spill, and the issues surrounding increased drug and alcohol abuse . As the commercial fishing industry continues to dwindle each year there will be a even greater need to help people cope psychologically with the increased financial stress to their families and communities. This project will be to make a concerted effort to help the people who are having a hard time emotionally with the ongoing effects of this oil spill to give them coping tools through trainings, direct counseling, reexamining cultural values and spiritual needs , and planning for the establishment of a Healing Center to be built in a retreat setting to facilitate the constructive changes which are needed in order to empower the affected people to lead sober and productive lives proud of who they are.

#95130

D. Project design

1. Objectives

The Project Director will coordinate public meetings in the villages of Tatitlek, Chenega, Cordova and Valdez to solicit the priorities of these communities to determine what they see as their most pressing problems regarding mental health. A planning consultant will also attend these meetings to work with the communities on visioning what kind of facility would be best suited to accomplish their goal and dreams of a well community. Because the truth is that "until we are all free, none of us are free", applies here too. Unless you deal with the underlying root causes of destructive behaviors in a society whether it is Native or non-Native then all the money you invest in projects and jobs ends up feeding that same destructive mentality which threatens to render a society powerless against its well being. Trainings will be conducted in the villages on delayed grief which has never been dealt with from generation to generation in the Native society dating back to the Russian era of enslavement and torture through the epidemics of the late 1800's and early 1900's on to the devastation of the "64" Earthquake and now the Exxon Valdez Oil Spill.

Living in the villages, the people knew they had a loss of their land in Russia selling Alaska to the Americans; they suffered the loss of their language when the School Systems forbid them to use their Native tongue, and the loss of their cultural values in an acculturation process to embrace the modern Western way of life; but they always believed they still had the bounty of the sea and the pristine atmosphere of the area surrounding their village to fall back on whenever they needed to. Since the Exxon Valdez Oil Spill that confidence has been dashed like the tanker itself, torn apart and no longer a resource to depend on. Losing the confidence that we had in being able to live off the land was just another loss in a series of losses that the Native people have felt since their lands were first "discovered ".What the trainings, counseling and development of a Healing Center will facilitate will be a closure and healing to these intergenerational losses so future generations of the people can be empowered to stop that cycle of abuse.

Methods

The staff at Chugachmiut will coordinate with the village councils, the mental health programs like the Advocates for Victims of Violence and the project leader Martha Vlasoff to hire a team of consultants including Jane Middleton Moz., a noted trainer in the field of post traumatic stress related issues, and Anna Lattimer President of Native Adult Children of Alcoholics who will be hired to conduct intensive workshops in the affected villages and communities. A planning consultant, Edward Deaux, Ph.D., from The Deaux Enterprise will be hired to conduct planning workshops in the villages for the establishment of the Healing Center. The project will be accomplished over a period of three years of which the first will be dedicated to conducting the intensive trainings and planning workshops. The second year will continue the trainings and work with Mental Health facilitators to develop outreach programs in the local communities to deal with the emotional problems identified by the consultants and coordinators in the first year of the program. There will also be a face-to-face conference in the second year to give the people of the oil spill-affected area an opportunity to share their experiences which they have not had an opportunity to do since the "89" oil spill. The third year will be dedicated to the establishment of the facility which will house the Healing Center.

The Project Directors will coordinate all hiring of consultants and their travel and accomodations in the villages. Also they will be in charge of coordinating the Healing Conference in the second year of the project. Proposals submitted by consultants and consulting firms in response to the Request for Proposals will detail how the consultants will facilitate the meetings and conferences, which communities will support the project, and identify organizations and local people who will work together to accomplish the goals of this project. Proposals will be submitted in the format of detailed work plans including a narrative describing the program proposed and details of the proposed budget.

3. Schedule

October 94	project approval
October 94	develop contract guidelines, evaluate bids award contracts
November -Jan 95	Coordinate with consultants and plan workshops
Feb. -June 95	Conduct workshops
July -Aug.95	Evaluate workshop proceedings
Sept. 95	complete project yearly report
Fy 96	Continued trainings, planning, and conference
Fy 97	Completion of the Healing Center

Technical Support
This project will require technical assistance which will be provided by the consultants.

Location
The location of this project will include the Chugach and Kodiak Region.

E.Project Implimentation
The Copper Mountain Foundation, which is a non-profit subsidary of the Tatitlek Corporation will be primarily responsible for the project with assistance from Chugachmiut, the regional non- profit corporation for the Chugach Region.

F. Coordination
In addition to working with the service programs of Chugachmiut the project will also coordinate with mental health and substance abuse prevention treatment providers throughout the area, including the appropriate divisions of the Alaska Dept. of Health and Social Services.

G. Public process
The public will be involved in all aspects of this project and there participation is key to the success of the project.

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H. Personnel Qualifications

The Project Directors have both worked on coordinating regional projects similar to the one proposed and the Chugachmiut non profit has been ifluential in the implimentation of mental health programs in the region since 1971. (for consultants see attached resume.)

I. Budget	Fy95	Fy 96	Fy 97
Personel	34.6	36.3	38.2
Travel	20.3	40.0	20.0
Contractual	29.0	27.0	25.0
Commodities	5.0	5.0	5.0
Equipment	10.0	5.0	5.0
General Administration	7.5	7.5	7.5
Total	106.1	120.8	100.7

Project Number
95134

Project Title: Chenega Bay Mariculture Development Project

Project Leader: Gail Evanoff

Lead Agency: Chenega Bay IRA Council

Cost of Project: FY 95 - $184.3; FY 96 - $77.5; FY 97 - $75.5

Project Start-up/Completion Dates: October, 1994 to September, 1997

Project Duration: 3 years

Geographic Area: Sawmill Bay, Prince William Sound

Contact Person: David Daisy, 3936 Westwood Drive, Anchorage, AK 99517; phone 243-8544, fax 243-1183

Introduction

This project is intended to provide a long term source of subsistence food and income for the residents of Chenega Bay. It will provide a means for the villagers to maintain their traditional lifestyle in the face of increased and sometimes conflicting use of this area of the Chugach region. The project was initiated in 1992, has already gone through feasibility testing, and has now reached the point where a major capital outlay and market development are needed to enable it to become self sufficient. Continued technical assistance with the project is also needed.

Project Need

This project is needed to replace lost subsistence resources and economic opportunities and provide the village with a means to develop a local bivalve resource in a manner that provides some level of protection against future man-made disasters such as EVOS. The oil spill amply demonstrated how vulnerable the local marine resource are to disasters such as the oil spill. As well as being an efficient way of utilizing the local marine environment, the mariculture techniques that will be utilized in this project will allow steps to be taken to protect the shellfish that are under culture from the effects of disasters such as EVOS.

Project Design

Objectives:

Obtain processing and culture equipment that will make the project more efficient and allow it to become self sustaining. This equipment includes a workboat, an

efficient anchoring system, a processing facility and processing equipment.

Make the growing and processing operation more efficient.

Develop a marketing plan for the cultured oysters.

Methods:

The shell of the processing facility is already in place. All that is needed is for the interior to be finished to meet health specifications and to be connected to water and electricity. The improved anchoring system design has been developed as have the specs for the processing equipment and workboat.

Schedule:

The processing shed will be finished off as soon as funds are available and water and electricity connected as soon as the ground is thawed. The workboat and processing equipment specifications have already been developed and will be ordered as soon as funds are available. Making the project more efficient will continue through 1997 under the guidance of a mariculture expert. A marketing consultant will be contracted in the spring of 1995 to help develop the marketing plan.

Technical Support:

Mariculture expert, marketing expert.

Location:

The project will take place near the village of Chenega Bay.

Project Implementation

The Chenega Bay IRA Council will be primarily responsible for the project with assistance from the Chugach Regional Resources Commission (CRRC).

Personnel Qualifications

The Chebega Bay IRA Council has been involved with the mariculture project since it began in 1992. CRRC has been providing administrative assistance. Jeff Hetrick of Alaska Aquafarms, Inc. will continue to provide training and technical guidance. Mr. Hetrick has extensive experience in mariculture development in Alaska. A marketing expert has yet to be identified.

Budget

This project will fund only a portion of the total mariculture budget. The following are those items from the budget that will be funded by this project,

Item	Estimated Cost FY 95	FY 96	FY 97
Personnel	$37.5	$37.5	$37.5
Travel	$6.0	$6.0	$6.0
Contractual	$23.3	12.0	10.0
Comodities	$15.0	$15.0	$15.0
Equipment	$85.5	$0.0	$0.0
General Administration	$17.0	$7.0	$7.0
Total	$ 184.3	$ 77.5	$ 75.5

Project Number
95135

Project Title: Provide funds to offset the increased cost of subsistence hunting and fishing

Lead Agencies: Chenega Bay Village IRA Council

Cost of Project: FY 95 $50.0 FY96 $50.0

Project Start-up/completion dates: January 1995 through September 1995

Duration of Project: Funding for this project should continue until subsistence resources in the harvest areas of Chenega Bay have been restored to pre-EVOS levels.

Geographic Area: This grant will support the community's subsistence gathering activities in Prince William Sound.

Contact Person:

Gail Evanoff
Chenega Corporation
P.O. Box 8060
Chenega Bay, AK 99574

Introduction:

Since the oil spill, declining subsistence resources in Prince William Sound have impacted the community of Chenega's harvesting efforts. The decline in resources requires the residents to travel further and stay out longer, which increases the cost and risk associated with subsistence activities. Funds provided by this grant will directly support the service of subsistence harvesting by reducing costs and risks currently associated with subsistence activities. The cost and risk to individual community members participating in subsistence gathering will be reduced by providing funds to hire larger local boats for the purpose of transporting hunters on a specified number of trips. By using larger, diesel powered boats, hunters will have the ability to cover a larger area more efficiently and with greater safety. This program may also benefit the community by increasing the variety of subsistence resources being harvested. Resources obtained on these trips will be shared with the entire community.

The Dept. of Community and Regional Affairs provided Chenega Bay with a similar grant in 1989/90. Funds for the grant were provided through the Oil Spill Community Assistance Grant Program.

Need For This Project:

Household surveys completed by the Dept. of Fish and Game, Subsistence Division for the years 1985, 1986, 1989, 1990, 1991, and 1992 document subsistence activities in Chenega Bay. The surveys show that the lingering impact to subsistence is not just to the total amount of resources being harvested but also to the types of resources being harvested. The following summarizes the results of the surveys.

The estimated subsistence harvest at Chenega Bay from April 1992 through March 1993 totaled 412.5 pounds per person, which exceeds documented pre-spill harvest levels. The 1992/93 data shows an increase in harvest rates over the preceding year and also exceeded harvest levels

documented several years before the oil spill. The pre-spill data was collected in 1984/85 and 1985/86 and shows harvests of 340.5 pounds per person. When looking at harvest data from Chenega Bay there are two factors that must be considered. The first is that Chenega Bay had just been reestablished when the 1984/85 and 1985/86 surveys were completed. Unfamiliarity with the area and younger, less experienced individuals attempting a subsistence life style for the first time since their childhood may have influenced harvest levels in the community. The second factor is that data is not available from Chenega Bay for the period immediately before the spill. Without this data it can only be assumed that harvest levels continued to increase from 1986 to March of 1989. This assumption is supported by data gathered in Tatitlek during 1988/89. The average subsistence harvest in Tatitlek in the two years immediately before the spill was close to 500 pounds per person. It is likely that harvest levels in Chenega Bay approached this level by the late 1980's.

Although harvest levels have been rebounding, obvious changes to the composition of the harvest have occurred since the oil spill. One of the more notable changes is the decline in the harvesting of marine mammals. In 1991/92, marine mammals contributed only six percent of the harvest, compared to 49 percent in 1984/85. Marine mammals also contributed at a similarly low level in 1992/93. An increase in the harvesting of fish indicates that fish are being substituted for marine mammals and other resources that have declined since the oil spill. In 1992/93, fish were 71 percent of the harvest, compared to 29 percent in 1984/85. Other changes to the composition of the harvest include:

- The herring harvest declined to less than half the average taken before the spill and was used and harvested by fewer households.

- In 1992/93 the harvest of rockfish exceeded all previous use levels and was used by more households than in pre-spill years.

- Although in 1992/93 the harvest of marine invertebrates was twice as high as pre-spill harvest rates, the number of families using clams declined from a pre-spill level of 87.5 per cent to 65.2 per cent in 1992/93. Families have travelled to beaches along Cook Inlet to harvest clams because of their scarcity near the village and the fear of oil contamination. The increase in marine invertebrate harvest is also in part a result of harvesting larger octopus from boats in deep water, rather than smaller ones from dens along the beach. These smaller octopus are preferred, but have been scarce since the spill.

- The shrimp harvest as well as the use of shrimp has declined to below pre-spill levels.

- The per person harvest of birds and eggs remains below pre-spill levels. The number of ducks harvested by the community is also below pre-spill levels.

- In 1992/93 the per capita harvest of black bear and deer was below 1985 levels. The number of families participating in the harvesting of deer was also lower than any time since 1985.

- In 1985/86, 43.8 percent of the households tried to harvest sea lions. In 1992/93, the number of households that tried to harvest sea lions decreased to 17.4 per cent.

#95135

- The number of families attempting to harvest harbor seals declined from 56.3 per cent in 1985/86 to 26.1 between 1991 and 1993.

In addition to gathering data through the survey process, Fish and Game staff also interviewed individuals involved in subsistence harvesting. Comments made during these interviews provided personal insights on how subsistence has changed in Chenega. The following presents some of the comments provided by Chenega Bay residents during the 1992/93 survey.

- The clams in the area I'm afraid to use. We went to Port Ashton to get as far away from oil as possible, and not go too far away. We're not gonna eat clams from the oiled areas. I still hunger for clams, shrimp, crab, octopus, gumboots. Nothing in this world will replace them. To finally be living in my ancestors' area and be able to teach my kids, but now it's all gone.

- We're not getting them [gumboots or chitons] here. We get more in English Bay and Port Graham.

- We were out six hours. [We] saw not one [bird] at Cape Elrington. [The] oil spill killed them all. I have been here [in Prince William Sound] 17 years. Now you can run all day and count all the birds on you see on one hand.

- The further you get from the North end of the island [which were oiled] the better the bird hunting.

- There are fewer deer now. Deer are way down since I moved here in '83. [You] used to see them frequently. I didn't even get my limit last year. You have to walk miles and miles before you see them.

- I went around Evans Island and Latouche and Elrington Island saw one mink and eight land otters on Elrington. [About Elrington Island] The animals are fewer than before.

- I went around the island [Evans Island] for seals. [I] didn't see any.

- [I] keep watching for seals. I don't see them any more...I traveled from Esther Island to Chenega Bay and saw one seal. I also went around Knight Island and never saw any.

- One elder discussing seal hunting reported that after the oil spill, they had to go about 32 miles to Icy Bay where there's a glacier. Sometimes they can't make it into the glacier because of the ice. He also added, "it gets expensive."

- We used to go hunting from Chenega Bay, to Bettles Island, about two miles from here. After the oil spill I never saw any seals out here. I've had to go 20 miles with a boat at times to get a seal.

Project Design:

Objectives: Reduce the cost and risk associated with having to travel further to find subsistence resources. Also increase the variety of subsistence foods vailable in the community. Resources harvested during these trips will be shared with the residents of Chenega Bay.

Method: Funds provided will permit the community to hire larger local boats to transport hunters to more distant locations. Funds will be used to hire and fuel the larger boats, hire and fuel skiffs, and hire a skiff operator. To be eligible to participate in this project all boat operators will be required to provide proof of insurance. The hunting trips funded through this grant will be shared by the residents that own boats capable of satisfying any requirements established.

Schedule: Funds provided by this grant will fund trips for one year. The number of trips will be determined by the amount of funds provided. Trips will begin shortly after a grant agreement is signed.

Location: The trips funded by this grant will be used for travel in Prince William Sound.

Project Implementation:

It will be the responsibility of the Chenega Bay IRA Council to implement and administer this grant.

Public Process:

The need for this project was identified by Chenega Bay representatives during a public meeting held in the community in June 1994. The community also submitted a similar request to the Oil Spill Trustee's during an earlier request for project proposals.

Personnel Qualifications:

Gail Evanoff is the vice-president of Chenega Corporation. She has worked extensively with state and federal agencies on oil spill projects. She was involved with the management of the oil spill shoreline treatment in the Chenega Bay area, as well as the management of the earlier grant received from DCRA to allow travel to other areas. She is familiar with the requirements vessels and vessel operators must meet to participate in government funded projects, and is also a highly qualified subsistence user.

Budget:

PERSONNEL	3.0
TRAVEL	1.5
CONTRACTUAL	40.0
COMMODITIES	3.4
EQUIPMENT	0
CAPITAL OUTLAYS	0
GENERAL ADMINISTRATION	2.1
TOTAL	50.0

Project Number:
95136

Project Title: Skin Sewing Crafts Restoration Project

Project Leaders: Monica Riedel

Lead Agency: Subsistence Divisions of ADF&G and NPS.

Cost of Project: FY 95 $29.9 FY 96 $29.9
Start/Completion Dates: 10/95 - 9/97

Project Duration: Two Years

Geographic Area: Chenega Bay, Tatitlek, Port Graham, Nanwalek, Cordova and Valdez.

Contact Person:
Don Callaway
National Park Service, Subsistence Division
2525 Gambell, Suite 102
Anchorage, AK
(907) 257-2408

95136

B. Introduction - Project Overview:

This project proposes to have Monica Riedel, a member of the Native Village of Eyak and owner of Dineega Specialty Furs in Cordova, conduct skin sewing workshops in the communities of Chenega Bay, Tatitlek, Port Graham, Nanwalek, Cordova and Valdez.

C. Need for the Project.

Subsistence resources have been traditionally used by these communities as items for clothing and are currently used by artists in these communities as a basis for small crafts production. The EVOS has limited access to these resources and has inhibited the growth of this self sustaining craft activity. In addition to helping sustain the continuity of this subsistence related service this project will help substitute an enhanced craft activity for economic activities current reduced as a consequence of the EVOS, e.g., commercial fishing.

D. Project Design.

1. Objectives:

To provide continuity in the opportunity to use subsistence related services damaged by the EVOS.

To provide an alternate resource for economic activities damaged by the EVOS.

2. Methods:

This project will conduct two workshops in each of the project communities during the next two years.

All crafts will be made from local resources (i.e., within Prince William Sound and/or Cook Inlet) purchased from Native subsistence hunters.

Existing space (e.g., in community or recreation halls) and materials (e.g., sewing machines) are available to conduct the workshops, although long term production of these crafts will require the construction of additional space and the purchase of additional technology.

3. Schedule:

The workshops will be scheduled to avoid conflict with existing subsistence activities and to maximize community membersA availability.

4. Technical Support:

There is no anticipation of the need for technical support.

5. Location:

The workshops will be conducted in existing community centers.

E. Project Implementation.

The project should be implemented through a cooperative agreement between the Native Village of Eyak (of which Monica Riedel is a member), the National Park Service (NPS) with a subsidiary cooperative agreement between the NPS and the subsistence division of the ADF&G. Section 809 under Title VIII of ANILCA empowers the Secretary to enter into cooperative agreements with other Federal agencies, the State, Native Corporations and other persons and organizations to oeffectuate the purposes and policies of this title.

F. Coordination of Integrated Research Effort.

This project is part of the Subsistence Restoration Planning and Implementation Project (94428), and would further the goal of restoring subsistence services damaged by the EVOS.

G. Public Process.

The Subsistence Restoration Planning and Implementation Project composed of state representatives from the Subsistence Division of ADF&G and the Municipal and Regional Assistance Division of DCRA, along with representatives of the Forest Service and NPS have met in public meetings with the communities of Chenega Bay, Tatitlek, Port Graham, Cordova (including members of the Native Village of Eyak), and Valdez (including the Valdez Native Association) to solicit their recommendations for oil spill restoration projects. This project description is a product of those public meetings. The public at large will have an opportunity to comment during the public process associated with dissemination of FY 95 Draft Work Plan.

H. Personnel Qualifications.

Ms. Riedel is an award winning Native craftsperson.

95136

I. Budget.

PERSONNEL	9.7
TRAVEL	15.1
CONTRACTUAL	0
COMMODITIES	12.1
EQUIPMENT	0
CAPITAL OUTLAYS	0
GENERAL ADMINISTRATION	5.0
TOTAL	**29.9**

Otter and Shrode Creek Barrier Bypass Project: Final Report

Project Number:	95139B
Restoration Category:	General Restoration (continuation of 94139B1 and B2)
Proposed By:	USFS
Cost FY 95:	$5,200
Cost FY 96:	$0
Total Cost:	$5,200
Duration:	1 year
Geographic Area:	Prince William Sound
Injured Resource/Service:	Cutthroat trout and Dolly Varden

INTRODUCTION

This proposal provides funding for the final report for the Otter Creek and Shrode Creek barrier bypass projects completed in FFY 94 (94139).

NEED FOR THE PROJECT

Otter Creek Barrier Bypass

An Alaska steep pass was built on a barrier falls near the mouth of Otter Creek in 1982. A July 1991 monitoring trip by the US Forest Service indicated that not all fish were able to move past a small vertical falls above the steep pass. Additionally, it was observed that two 1.5 m cascades could be modified for easier passage to a 55 acre lake and a 3 acre pond. The project provides access for all salmon, trout and Dolly Varden.

Shrode Creek Barrier Bypass

The Shrode Creek fishway was initially constructed in 1962 to bypass a 3 m barrier falls and provide consistent access to Shrode Lake and two small unnamed lakes. These lakes are utilized by sockeye, coho, and pink salmon as well as cutthroat trout and Dolly Varden char. Chum salmon are also present in the creek. A 1991 inspection indicated the need for immediate replacement of the gabion baskets as many salmon were impaled and gilled by the deteriorating gabions. The lower concrete wall was undercut by the current and needed to be replaced.

PROJECT DESIGN

A. Objectives

The objective is to complete the final report for EVOS Project 94139 for Otter Creek and Shrode Creek.

B. Methods

Otter Creek Barrier Bypass

A fishpass was designed and constructed to overcome a 1.5 m falls. Two 1.5 m cascades were modified for easier passage. The water level in a jump pool was raised by means of gabions.

Shrode Creek Barrier Bypass

Gabion baskets were replaced and a new cement wall was constructed.

C. Schedule

Oct. 1, 1994 - Jan 15, 1995	Prepare draft report
Jan. 15, 1995	Report distributed for internal review
Feb. 15, 1995	Report distributed for EVOS peer review
April 15, 1995	Report distributed to Trustees

D. Technical Support

None required.

E. Location

Glacier Ranger District office.

PROJECT IMPLEMENTATION

To be carried out by the Glacier Ranger District USFS.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Not applicable.

FY 95 BUDGET ($K)

Personnel	4.5
Travel	0.0
Contractual	0.0
Commodities	0.0
Equipment	0.0
Subtotal	4.5
Gen. Admin.	.7
Total	5.2

Salmon Instream Habitat and Stock Restoration--Pink Creek and Horse Marine Barrier Bypass Development

Project Number:	95139D
Restoration Category:	General Restoration
Proposed By:	ADFG
Cost FY 95:	$61,600
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	5 years
Geographic Area:	Kodiak Island and Afognak Island
Injured Resource/Service:	Sockeye salmon and pink salmon

INTRODUCTION

This project is result of a Trustee Council funded three-year survey of the Kodiak Island oil-impact area which identified feasible, cost effective instream habitat restoration and development techniques for salmon. In 1993 (FY94) one project on Afognak Island (Little Waterfall Creek) was identified as feasible and was funded by the Trustees. The selection of this project was based on preliminary cost to benefit data. Two additional projects have been identified on Kodiak and Afognak Islands as cost-effective upon further cost to benefit analysis. These projects are designed to replace injured salmon spawning habitat by providing access to existing habitat. The projects are: 1) Horse Marine Creek Barrier Bypass - Kodiak Island; 2) Pink Creek Barrier Bypass - Afognak Island.

Horse Marine Creek Barrier Bypass:
The project at Horse Marine Creek on southern Kodiak Island will provide access to spawning habitat capable of supporting 15,307 pink, 3,124 coho and 8,594 sockeye salmon. With consistent escapements to this habitat,annually, approximately 28,214, 22,914 and 90,237 pink, coho, and sockeye salmon would be produced. The average escapement of pink salmon at Horse Marine Creek has been 3,864. Coho and sockeye escapements do not reach optimum levels at low flow periods. The project will benefit areas effected by the oil spill by replacement production.

Pink Creek Barrier Bypass:

The project at Pink Creek on Afognak Island will provide consistent access to spawning habitat capable of supporting 4,512 pink and 516 coho salmon. Consistent annual escapements into this habitat could produce 8,317 and 3,782 pink and coho salmon, respectively. Pink Creek drains into Afognak Bay which was oiled in 1989.

NEED FOR THE PROJECT

These projects will help restoration by enhancing salmon populations and improving the commercial, sport, and subsistence fishing opportunities on Afognak and southern Kodiak Islands. Thus, lost fishing opportunities, as result of the oil spill, will replaced or mitigated for.

PROJECT DESIGN

The goal of this project is to increase pink, coho and sockeye salmon spawning capability, and overall salmon returns, by enhancing fish passage above barriers in Horse Marine and Pink Creeks.

A. Objectives

1. Final evaluation of pre-project production parameters (egg-to-fry survival, salmon escapement and spawning distribution)

2. Determine final barrier bypass design for Horse Marine Creek..

3. Obtain the necessary permits for construction .

4. Construct two barrier bypasses in the oil spill impacted area.

5. Evaluate the success of the barrier bypasses by estimating spawning numbers utilizing enhanced habitat as well as the relative abundance of juveniles produced each year.

6. Conduct necessary project maintenance each year.

7. Provide documentation of project progress and results.

B. Methods

Horse Marine Creek:
A barrier bypass will be designed and constructed to facilitate salmon passage over a 3.0 m falls. Low water diversion structures will be installed and a salmon diversion weir constructed to lead salmon into entrance tanks.

Pink Creek:

This project will require a channel be cut with diversion of stream flow to allow salmon passage over 1.9 m falls.

C. Schedule

Each project will require pre-construction planning, permitting and surveys, construction, and a period of five years for performance monitoring. This evaluation period is necessary for projects producing sockeye and/or coho salmon which return as adults at age 5 or 6. The Horse Marine Creek project will likely require construction to be contracted, thus, initial planning is scheduled for FY95 with construction in FY96. The Pink Creek project will be completed in FY95. The following table describes the anticipated schedule of tasks for years 1 and 2 for each project.

Task	Period	Pink Creek	Horse Marine Creek
Pre-project surveys, planning	10/94-9/95	X	X
Final engineer surveys	7/95		X
Permitting, planning, administration, award contract	1/95 - 4/95	X	X
Project construction	5/95 - 6/95	X	
	5/96 - 6/96		X
Spawner abundance estimates	8/95 - 11/95	X	
	8/96 - 11/96		X
Progress reports	as required	X	X
Egg-to-fry survivor estimates	3/96	X	
	3/97		X

D. Technical Support

General administrative support is provided by the Administrative, Habitat and Restoration Division, and Commercial Management and Development Divisions (CFMD) of the Alaska Department of Fish and Game (ADFG). The project leader of this project is primarily funded by general funds and program receipts (Kodiak Regional Aquaculture Association - KRAA - cooperative funding) from the State of Alaska. Engineering support is provided by CFMD of the ADFG, funded by general funds from the State of Alaska. This study is directly associated with ongoing rehabilitation and enhancement projects funded by program receipts provided by KRAA.

E. Location

The project will be located at Pink Creek on Afognak Island and Horse Marine Creek on southern Kodiak Island. Pink Creek drains into Afognak River which drains into Afognak Bay on eastern Afognak Island. Horse Marine Creek drains into Olga Bay. The benefits of this

project will be realized by increasing pink, coho and sockeye salmon returns to these systems, providing salmon for harvest. The residents of the city of Kodiak, and the village on northern Afognak Island as well as southern Kodiak Island will benefit economically from this project through direct commercial fishery receipts and all associated business enhancement. In addition, sport fishers, guides, and lodge owners as well as subsistence fishers, will benefit directly and provide direct economic return to the associated communities.

PROJECT IMPLEMENTATION

The Alaska Department of Fish and Game (ADFG) will implement the project. The steeppass construction at Horse Marine Creek will likely require implementation through a competitive contract process. The ADFG is currently managing approximately eight barrier bypass projects on Kodiak and Afognak Islands, therefore, is the appropriate agency to implement this project.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The ADFG, CFMD Division, Development and Research Sections operate sockeye, coho king and pink salmon development projects at Frazer, Pauls/Laura, Portage and Little Waterfall Creeks, located on Kodiak and Afognak Islands. The Department conducts all maintenance, monitoring and evaluation activities associated with this fisheries development program with funding provide by KRAA through program receipts. This includes lake enrichment, smolt sampling, limnological sampling, and weir operation. In addition, the Finfish Management Section of CFMD Division conducts fisheries management operations in the area.
Also, KRAA operates a sockeye stocking programs via Pillar Creek Hatchery at Hidden Lake. In addition, KRAA operates Kitoi Bay Hatchery on northern Afognak Island, producing pink, coho, chum and sockeye salmon for commercial harvest. All evaluation associated with Pillar Creek and Kitoi Bay hatcheries is conducted by ADFG with funds provided by KRAA program receipts. Lastly, the Alaska Department of Natural Resources, Kodiak State Parks operates several coho escapement weirs on Shuyak Island, located just north of Afognak Island. The ADFG provides equipment and logistical support, as well as conducting aerial salmon escapement surveys in the area. This project will be coordinated with all of the above mentioned programs.

FY 95 BUDGET ($K)

Personnel	42.7
Travel	1.2
Contractual	4.2
Commodities	6.8
Equipment	0.0
Subtotal	54.9
Gen. Admin.	6.7
Total	61.6

Project Number
95140

Project Title: Subsistence Skills Program

Project Leaders: Helmer Olson

Lead Agency: Valdez Native Association

Cost of Project: FY 95 $36.7 FY 96 $36.7
Start/Completion Dates: 1/95 through 9/95

Project Duration: 3 years

Geographic Area: Valdez, Alaska

Contact Person:

Helmer Olson, President
Valdez Native Association
P.O. Box 1108
Valdez, AK 99686
(907) 835-4951

B. Introduction - Project Overview:
This project would provide funding for programs to support the passing on of subsistence skills, communication between the generations and to promote community healing. Classes would be provided in various activites, including survival skills, carving, beading, and Native drumming and dancing. Support would also be provided for community gatherings, such as potlaches, as well as storytelling by elders.

C. Need for the Project.
In the summer of 1989, the Exxon Valdez oil spill all but turned the community of Valdez on its head. In addition to concerns about the possible effects of the oil on the safety of subsistence resources, there was economic and social upheaval as well. The population of the City of Valdez swelled from 4,300 to over 12,000 in a matter of weeks. This massive influx of transients overwhelmed the town, and disrupted the normal social, cultural and subsistence activities of the residents. This disruption was keenly felt by the Native community in Valdez. The additional population created pressure on existing facilities in the city, and as a result, food prices and rents skyrocketed. Many community residents found it necessary to take the higher paying oil spill jobs in order to keep up with the increased cost of living in the community. These jobs were usually 60 hours per week, and required employees to be away from home. Subsistence hunting and commercial fishing were abandoned, both because of contamination fears, and because all the activity aimed at cleaning up the oil would make such activities difficult, if not impossible to carry out. Traditional ways of coping with disaster were insufficient to deal with the situation.

Some people responded to the combination of the disruption of their normal lives and the high salaries they received as oil spill workers, by reverting to substance abuse. The result was a dramatic increase in domestic violence, family breakups, and mental health problems. This, in turn, meant the disruption of the social, cultural and subsistence activities continued beyond the departure of the oil spill workers.

The Board of Directors of the Valdez Native Association sees a need to reinforce the traditional heritage of the Native community in Valdez in order to repair the damage to subsistence activities and the transmission of traditional knowledge caused by the EVOS.

Cultural activities normally enjoyed by the Valdez Natives range from fur sewing, beading, ivory carving and various forms of traditional dancing. The individuals who possess these skills are often quiet craftsmen who, left to themselves in a semi-urban setting, overlook the need to pass on their skills. This program would provide the opportunity for these people to display their skills and crafts, and teach them to others.

The traditional Native potlach meal has long been a source of community spirit that permits friends and relatives to get together to eat and share events with each other. A potlach also serves as an opportunity to allow leaders to recognize the accomplisments of young people, acknowledge the importance of elders, to seek testimonials of conflict resolution, adversity and personal growth. These all help to engage a community and create a spirit of togetherness, family and purpose.

This project will help restore pride in Native accomplishment, and help to restore the subsistence services that have been disrupted by the Exxon Valdez oil spill and its aftermath.

D. Project Design.

1. Objectives:
To restore subsistence services, the transmission of traditional skills and knowledge, and community cohesion, damaged by the EVOS.

2. Methods:
This will be done by providing classes to teach skills, traditions and crafts, and by holding traditional community getherings and potlaches. This will help to restore subsistence activities, and will also help foster communication between community elders and young people.

3. Schedule:

Community gatherings	1 time each year
Beadworking classes	4 times each month
Native drumming and dancing	2 times each month
Life coping skills	1 time each month
Ivory carving classes	2 times each month
Russian Christmas	1 time each year
Native language workshop	1 time each week
Basketry classes	6 times each year
Survival skills training	2 times each year
Women's group meetings	1 time each month
Youth leadership meetings	1 time each month
Elders memories (storytelling)	1 time each month
Traditional cooking/baking	8 times each year

4. Technical Support:
This project will not require technical support as defined in the Invitation to Submit Restoration Projects for Fiscal Year 1995.

5. Location:
The classes and gatherings will take place in Valdez. When possible, the offices of the Valdez Native Association will be used, but for some of the larger gatherings, it will be necessary to rent a hall in the community.

E. Project Implementation.
The project should be carried out by the Valdez Native Association.

F. Coordination of Integrated Research Effort.

This project is part of the Subsistence Restoration Planning and Implementation Project (94428), and would further the goal of restoring subsistence services damaged by the EVOS.

The Valdez Native Association already has a program in place to facilitate the disribution of native foods from local hunters to elders. VNA also has a scholarship program which is funded by proceeds from weekly bingo games.

G. Public Process.

The Subsistence Restoration Planning and Implementation Project composed of state representatives from the Subsistence Division of ADF&G and the Municipal and Regional Assistance Division of DCRA, along with representatives of the Forest Service and NPS have met in public meetings with the communities of Chenega Bay, Tatitlek, Port Graham, Cordova (including members of the Native Village of Eyak), and Valdez (including the Valdez Native Association) to solicit their recommendations for oil spill restoration projects. This project description is a product of those public meetings. The public at large will have an opportunity to comment during the public process associated with dissemination of FY 95 Draft Work Plan.

H. Personnel Qualifications.
Helmer Olson is the President of the Valdez Native Association. He has a demonstrated track record of running state and federally funded programs. Since 1990, he has guided VNA in assuming responsibility for several grant programs previously run by the regional Native association.

I. Budget.

PERSONNEL	2.0
TRAVEL	1.5
CONTRACTUAL	28.2
COMMODITIES	
EQUIPMENT	0
CAPITAL OUTLAYS	0
GENERAL ADMINISTRATION	5.0
TOTAL	**36.7**

Afognak Island State Park Interim Support

Project Number:	95141
Restoration Category:	General Restoration
Proposed By:	DNR
Cost FY 95:	$309,400
Cost FY 96:	$21,500
Total Cost:	$395,400
Duration:	5 years
Geographic Area:	Afognak Island
Injured Resource/Service:	Marbled murrelet, harlequin duck, black oystercatchers, river otters, harbor seals, sea otters, anadromous fish, bald eagle nests, and recreation.

INTRODUCTION

In November 1993, the Trustee Council purchased 41 thousand acres of land adjacent to Seal Bay, Afognak Island. In its resolution accepting the seller's offer, the Council found that these lands "include important habitat for several species of wildlife for which significant injury resulting from the oil spill has been documented." The resolution cited important nesting areas for marbled murrelet; nesting and foraging areas for harlequin ducks; adjacent shore used by black oystercatchers and river otters; harbor seal haulouts along the shoreline; concentrations of sea otters off Tolstoi Point; eight documented anadromous streams; ten documented bald eagle nests; and high value wilderness-based recreation such as hunting, boating and fishing.

In May 1994, the Alaska State Legislature designated the land and water around Seal Bay as Afognak Island State Park. A letter of intent accompanying the act stated, in part:

> It is the intent of the legislature that sources of funding other than state general funds be sought for the management of Afognak Island State Park. It is also the intent of the legislature that at least five public use cabins be built within Afognak Island State Park. A primary source for these purposes is moneys managed by the *Exxon Valdez* Trustee Council.

This proposal requests funds necessary to manage and protect Afognak Island State Park until such time as the State can generate moneys for that purpose.

NEED FOR THE PROJECT

Until reliable sources of funding for operations and maintenance of the new state park are secured, the most that can be expected is periodic visitation from park rangers out of Kodiak. Interim support for operations will enable field staff and volunteers to monitor use of the new park and discourage resource degradation, as well as oversee actions taken to comply with the road closure plan and reforestation requirements. Compliance with the road closure plan and reforestation requirements is the responsibility of the seller.

The logging roads in the park were created by removing overburden to bedrock and then grading the bedrock. It will take many years for the road beds to revegetate. The statutory road closure requirements, with which sellers must comply, will stabilize the road surfaces but not lead to revegetation. This project will move the overburden back onto the road surfaces leading to natural revegetation of the road surfaces.

Revegetation of the road surfaces will restore, to some extent, habitat values diminished by roadbuilding. In addition, some roads in the park should be converted to trails provided they serve restoration objectives. For example, they could channel public use away from sensitive habitats or enhance recreational experience.

PROJECT DESIGN

A. Objectives

1. Assurance that public use of Afognak Island State Park is consistent with restoration objectives.

2.. Compliance with the road closure plan and reforestation requirements, which are the responsibilities of the seller.

3. Restoration of habitat through revegetation of road surfaces.

4. Conversion of certain roads to trails to meet restoration objectives.

B. Methods

1. Permanent seasonal staff will make occasional visits to the park; develop, in coordination with ADFG, a land use and management plan for the park; and identify cabin sites sensitive to injured resources and services.

2. Volunteers in Parks (VIPs) will monitor public use of the park and develop a resource inventory for use by staff in forming a land use and management plan for the park and identifying cabin sites.

3. Overburden will be moved onto approximately nine miles of roadbeds so they can revert to natural vegetation. This effort will be completed during FY 96.

4. A plan will be developed to convert some existing roads to trails. The plan will be completed in FY 96.

C. Schedule

Recruitment of volunteers would begin in December 1994. Permanent seasonal staff and volunteers would be onsite from late May through August. The trail conversion plan and revegetation efforts will be completed in FY 96.

D. Technical Support

None.

E. Location

Afognak Island State Park.

PROJECT IMPLEMENTATION

Afognak Island State Park will be operated and managed by the Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation, through permanent seasonal staff and Volunteer in Parks (VIPs). Pulling overburden back onto roadbeds will be done under contract.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The Division of Parks and Outdoor Recreation will coordinate its actions with other Trustee Council actions on Kodiak, Afognak, and Shuyak Islands.

FY 95 BUDGET ($K)

Personnel	10.0
Travel	8.0
Contractual	270.0
Commodities	2.0
Equipment	0.0
Subtotal	290.0
Gen. Admin.	19.4
Total	309.4

Contractual services is the estimated cost of pulling overburden back onto the roadway of logging roads to provide a climate for natural revegetation. There are approximately nine miles of 16-foot wide logging roads to be rehabilitated on Afognak Island. The logging roads in the park were created by removing overburden to bedrock and then grading the bedrock. It will take many years for the road beds to revegetate. The statutory road closure requirements, with which sellers must comply, will stabilize the road surfaces, for example, by removing bridges and culverts; however, they not lead to revegetation. Revegetation of the road surfaces will restore, to some extent, habitat values diminished by roadbuilding. A contract is expected to be issued in FY 95, with work continuing through FY 96.

Prince William Sound Herring Genetic Stock Identification

Project Number:	95165
Restoration Category:	General Restoration (carry-forward)
Proposed By:	ADFG
Cost FY 95:	$105,400
Cost FY 96:	$118,300
Total Cost:	Unknown
Duration:	3 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring

INTRODUCTION

Herring are a major resource in Prince William Sound from both a commercial and ecological perspective. The timing of the *Exxon Valdez* oil spill (EVOS) overlapped the annual spring migration of herring spawners to nearshore staging areas. Over 40% of the herring spawning staging and egg deposition areas and over 90% of the documented summer rearing and feeding areas were lightly to heavily oiled prior to the spawning events. As a result, herring encountered oil during each of their four life stages in 1989 and, to a lesser extent, in 1990. Adult herring traversed oil sheens and mousse while traveling northward and eastward. Eggs were deposited on oiled shorelines and were "dipped" in sheen through tidal action while incubating. Larvae hatched that contained lipophilic petroleum hydrocarbons in their yolk sacs and encountered sheen near the surface while in their most sensitive state. Post-larval or juvenile herring swam through and remained near lightly to heavily oiled shorelines, regularly encountering sheen, mousse and dissolved oil particulates and components through the summer while feeding in shallow nearshore bays and passes.

In 1993, the total observed spawning population was less than one-third of preseason predictions and the average sizes of herring in each age class were some of the smallest on record. Only limited commercial herring fishing occurred. Preliminary pathology results implicated viral hemorrhagic septicemia (VHS) as a potential source of mortality and stress. In 1994, as in 1993, the spawning population was below preseason predictions. Aerial surveys indicated the population was less than minimum threshold harvest levels and no commercial fishing was allowed. The ex-vessel value of the herring fisheries in 1992 was $12.0 million. In 1993, the ex-vessel value dropped to $2.0 million and no commercial harvest occurred in 1994.

This project will enable resource managers to better understand herring population dynamics to improve the recovery process. In addition, it will aid local resource users to make appropriate pre-season plans based on accurate and precise herring projections.

Incorporating genetically derived stock structure is crucial to the success of any fisheries or restoration program. Consistent exploitation of mixed stocks has to lead to the demise of the least productive stocks. Unfortunately, defining the stock structure of herring has been particularly difficult. There is evidence that herring home, but straying may also be substantial. Morphological and meristic differentiation of herring from discrete geographic regions has been used as evidence for the existence of genetically distinct stocks, but much of this variation may be environmentally mediated and has not been confirmed with genetic data.

Previous surveys of herring using the genetic techniques of allozyme electrophoresis have generally revealed differentiation only over broad geographic regions. Two distinct races of Pacific herring (Asian/Bering Sea - eastern North Pacific) have been defined, with further subdivision between Gulf of Alaska and more southerly North Pacific stocks. However, more recently, genetic divergence among local spawning populations of Pacific herring in the vicinity of northern Japan using allozyme markers has been described.

An explosion of new genetic techniques has occurred in recent years as a result of recent advances in molecular biology. The utility of these newer techniques to detect fine genetic structure in Pacific herring has not been properly assessed. We propose to use a combination of current allozyme techniques combined with mitochondrial and nuclear DNA techniques to more accurately define the stock structure of herring from the EVOS-affected area. The data can also be used to estimate the stock composition of non-spawning aggregations contributing to the fisheries in Prince William Sound. These data on stock structure will be essential in improving the stock assessment model in Prince William Sound and therefore the development of a restoration plan for the damaged herring stock.

NEED FOR THE PROJECT

Pacific herring *Clupea pallasi* are a major resource in Prince William Sound (PWS) from both commercial and ecological perspectives. Five commercial herring fisheries in PWS have an average annual combined ex-vessel value of $8.3 million. Pacific herring provide important forage for many species including some species severely injured by the *Exxon Valdez* oil spill. Predator species include humpbacked whales, seals, sea lions, gulls, sea ducks, shorebirds, halibut, salmon, rockfish, and other fish. In addition, several thousand pounds of herring and herring spawn-on-kelp are harvested annually for subsistence purposes and form an important part of the local native culture of Chenega and Tatitlek.

The goal of this project is to improve the accuracy of current stock assessment methods and models thus improving resource management. Incorporating genetically derived stock structure is crucial to the success of any fisheries or restoration program. Improved accuracy of stock distribution information will allow fishery managers to make fine adjustments of fishing quotas to harvest the maximum available surpluses with the lowest possible risk of overharvest, damage to the resource, or economic loss to the fishing industry. This information is also needed to help interpret oil spill damage results. Because commercial and subsistence herring harvests represent substantial contributions to local economies, intensive management is expected to benefit all communities in PWS. Restoration efforts can be directed and evaluated through improved fishery management and continued resource monitoring.

PROJECT DESIGN

A. Objectives

We propose to initiate a study to test for genetic heterogeneity among spawning aggregations of Pacific herring within Prince William Sound. The objectives of the study are to:

1. Screen population samples using an array of molecular techniques for DNA-level genetic analysis. Techniques under consideration include DNA sequencing of mitochondrial and nuclear regions, microsatellite analysis (analysis of regions with variable number of tandem repeats (VNTR)), RAPD analysis (random amplified polymorphic DNA markers), and restriction analysis of mitochondrial and nuclear regions.

2. Screen population samples using alloyzme electrophoresis.

3. Evaluate the null hypothesis a single panmictic population of herring Prince William Sound using the results from a and b above.

A comprehensive survey of the entire EVOS-affected areas may be designed in future years pending the results of Objective 3.

B. Methods

Field collections of spawning Pacific herring will be made from four representative sites within Prince William Sound. The collection sites will be chosen to maximize the potential genetic differentiation among the aggregations. A sample of 100 individuals will be collected from each aggregation. Tissue extracts from muscle, liver, eye, and heart will be collected. Extracts from individual fish will be preserved in both alcohol and in liquid nitrogen.

A request for proposal will be issued for the molecular analyses to be conducted at the contractor's facilities. Allozyme electrophoretic analysis will be conducted by ADFG following standard protein electrophoretic techniques.

The specific molecular techniques to be investigated will be chosen based on: 1) a review of the current literature and recently available research results, and 2) responses and qualifications of competitive bidders.

C. Schedule

Activity	Inclusive Dates	
Advertise and award contract for DNA analyses	October 1994	January 1995
Collection of baseline samples	April 1995	
Laboratory analyses	May 1995	December 1995
Draft status report FY95	March 1996	
Second-year sample collection	April 1996	December 1996
Second-year lab analyses	May 1996	December 1996
Final status report FY95	August 1996	
Draft final report	March 1997	
Final report	August 1997	

D. Technical Support

Administrative support is provided by the Administrative, Habitat, and Commercial Fisheries Management and Development Divisions (CFMD) staff of the Alaska Department of Fish and Game. The project leaders are fully funded with general funds from the State of Alaska. Project assistants are fully or partially funded by this project. Laboratory support is provided by the ADFG Genetics Program which includes facilities for tissue archival, allozyme analysis, PCR-based and other DNA analyses, and data analyses. These studies are integrated with ongoing studies by the CFMD for efficiency in completing the objectives.

E. Location

Field research will be conducted within the confines of PWS and exact locations will depend upon the distribution of spawning herring. Laboratory studies and data analysis will be conducted at the ADFG area office in Cordova and regional office in Anchorage.

PROJECT IMPLEMENTATION

The statewide genetics laboratory within the Division of Commercial Fisheries Management and Development is located in Anchorage and is well equipped for allozyme and DNA studies. Current staff include geneticists, a genetics biometrician, and laboratory technicians. Collection of specimens and biological data will coordinated by ADFG's ongoing herring research program in Prince William Sound and with the EVOS project Disease Impacts on Prince William Sound Herring Populations.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The genetic analyses and biometric analyses will be coordinated among all Trustee Council projects related to genetics including 94320D, 94191, and 94255.

Sharing of project results will be used to evaluate and revise current strategies for management of commercial herring fisheries if warranted. Project results will also be used to improve our understanding of results from previous oil spill damage assessment studies.

FY 95 BUDGET ($K)

Personnel	30.6
Travel	2.0
Contractual	60.5
Commodities	3.5
Equipment	0.0
Subtotal	96.6
Gen. Admin.	8.8
Total	105.4

Institute of Marine Science - Seward Improvements EIS

Project Number:	95199-CLO
Restoration Category:	Administration, Public Information and Science Management (closeout)
Proposed By:	ADFG
Cooperating Agencies:	All Trustee Agencies
Cost FY 95:	$46,500
Cost FY 96:	$0
Duration:	1 year
Geographic Area:	Gulf of Alaska
Injured Resource/Service:	Multiple resources

INTRODUCTION

On January 31, 1994 the Trustee Council approved financial support for project 94199, Required Infrastructure Improvements for the Institute of Marine Science - Seward and authorized the Executive Director to:

1. Take necessary steps to secure NEPA compliance;

2. Consult with appropriate entities, including the University of Alaska, the City of Seward, the Seward Association for the Advancement of Marine Science, and appropriate Trustee Agencies to review the assumptions relating to the proposed improvements and capital and operating budgets;

3. Develop an integrated funding approach which assures that the use of trust funds are appropriate and legally permissible under the terms of the Memorandum of Agreement and Consent Decree;

4. Prepare a recommendation of the appropriate level of funding for consideration by the Trustee Council that would be legally permissible under the terms of the Memorandum of Agreement and Consent Decree.

This project will close out the process of preparation of the Environmental Impact Statement

and the consultation needed to prepare the revised project description and budget for the proposed expansion and improvements of research facilities affiliated with the Institute of Marine Science in Seward.

NEED FOR THE PROJECT

Federal law requires an Environmental Impact Statement (EIS) for major federal actions significantly affecting the quality of the human environment. The Trustee Council members have agreed that this project would follow an EIS process for NEPA compliance.

Additionally, the project provides for the completion of consultation and analysis needed to develop a recommendation regarding use of settlement funds that would be appropriate and legally permissible to support proposed improvements with an estimated cost of up to $25 million. The Trustee Council is likely to consider this recommendation in late October 1994.

PROJECT DESIGN

A. Objectives

In FY 94, the first objective was to initiate a process to review the assumptions relative to the research functions, improvement needs, and capital and operating budgets for the proposed facility. The second objective was to initiate and formulate a National Environmental Policy Act process to identify and analyze the environmental and social consequences of the proposed facility. The third objective was to review the proposed improvements to ensure that they are legally permissible under the terms of the Memorandum of Agreement and Consent Decree. In FY 95, the objectives will be to complete and publish the EIS Record of Decision and to finalize the Executive Director's recommendation to the Trustee Council concerning the appropriate level of capital funding for the facility. It is anticipated that this project will close out by December 31, 1994.

B. Methods

The first objective was accomplished through the formation of a Scientific Review Group comprised of Trustee Council representatives and the University of Alaska to review the project assumptions and advise the Seward Association for Advancement of Marine Science (SAAMS) and the project architects and consultants on the design and operation of the proposed improvements.

The second objective was accomplished through development and publication of an EIS for the proposed facility.

The third objective was accomplished through regular consultation between the project staff and the Trustee Council legal team and review of a detailed construction cost budget for the

progress schematic design of the proposed facility.

In FY 95, objectives will be met through preparing and publishing the Record of Decision for the proposed project and preparation of a revised project description and budget for the Executive Director containing the results of the consultation and EIS process described above.

C. Schedule

The Draft EIS was published on June 17, 1994. The Final EIS is scheduled to be published on or before September 16, 1994. The Record of Decision is scheduled to be published on or before October 28, 1994. The revised project description will be distributed in mid-September. The Executive Director's funding recommendation is scheduled to be acted on in late October.

D. Technical Support

Federal and state agency and University of Alaska personnel will provide technical expertise to the Scientific Work Group, the review of assumptions associated with the project, and the EIS process. Consultants to SAAMS will provide architectural, engineering, project management, and EIS preparation expertise. The Chief Scientist and peer reviewers will review the research assumptions associated with the project.

E. Location

All of the analysis and writing will be conducted in Anchorage, Alaska.

PROJECT IMPLEMENTATION

The ADFG project coordinator will be responsible for consultation with appropriate entities and preparing the revised project description and budget for the Executive Director's funding recommendation. The DOI EIS coordinator will be responsible for ensuring that the EIS process is completed on time.

COORDINATION OF INTEGRATED RESEARCH EFFORT

During FY 94, meetings were held with representatives of other Gulf of Alaska marine research facilities (PWS Science Center, Copper River Delta Institute, Fisheries Industrial and Technical Center, Auke Bay Laboratories) to coordinate and discuss the research functions of the proposed facility. Additionally, regular contacts are kept with the Chief Scientist to keep him apprised of planning for the proposed facility. Meetings were also held with University of Alaska - Fairbanks researchers involved in the SEA program to coordinate the facility, vessel, and anticipated research components of the project.

FY 95 BUDGET ($K)

Personnel	29.3
Travel	10.1
Contractual	1.9
Commodities	0.6
Equipment	0.0
Subtotal	41.9
Gen. Admin.	4.6
Total	46.5

Public Access

Project Number:	95200
Proposed By:	ADNR
Cooperating Agency:	USFS
Cost FY 95:	$154,700
Cost FY 96:	$256,100
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Prince William Sound and Kodiak Island Borough
Injured Resource/Service:	Multiple resources

INTRODUCTION

The Alaska Native Claims Settlement Act (ANCSA) provided for identification of easements to access public land. They were identified in the conveyance process and recorded in conveyance documents, but have not been depicted graphically in any publication.

The proposed project has two phases:

Phase I. Identification and mapping of easements in atlases for public distribution for the Prince William Sound area and Kodiak Island Borough.

Phase II. Marking of easements in Prince William Sound to accurately locate them and to preserve continued right of access.

This project directly addresses the Trustee Council's concern about public access in the habitat protection process. Furthermore, the clear, graphic depiction in a single-source document of the location of legal access to public land will expand and enhance public recreation opportunities.

Phase I of this project was proposed in FY 94 as 94200. It was disapproved by the Trustee Council with the recommendation that "ADNR coordinate with the federal agencies on the development of a recreation plan for the spill area and expenditure of state criminal funds." Trustee Council action preceded recent concerns about public access in the habitat protection

process. Nonetheless, in compliance with the Trustee Council's recommendation, ADNR has submitted to Alaska State Parks a request for state restitution funds for preparation of easement atlases for Prince William Sound and Kodiak Island Borough. A decision is not expected until late Summer 1994.

NEED FOR THE PROJECT

Access is a critical element for management and use of land whether federal, state or privately owned. Completion of the Prince William Sound Access Atlas and an acess atlas for the land within the Kodiak Island Borough will provide restoration teams, scientists, negotiators for land acquisitions and recreational users with graphic depiction of land ownership and the legal public access at a scale of 1" to a mile as well as written narratives of each easement. The atlases will be available for use by governmental agencies and the public if funding becomes available for collecting and entering information into GIS as well as project completion.

An easement atlas for the Kenai Peninsula Borough was published in December 1993 as part of the Kenai Area Plan for State Lands.

PROJECT DESIGN

A. Objectives

1. Create 1:63,360-scale maps of the following data for Prince William Sound and the Kodiak Island Borough:
   a. land ownership;
   b. ANCSA 17(b) easements across private land;
   c. roads, trails, docks and airports that provide public access; and
   d. navigable waterbodies.

2. Ensure continued right of access in Prince William Sound under 43 CFR by marking ANCSA 17(b) easements.

B. Methods

Phase I - Identification and Mapping (Lead agency: ADNR)

1. The U.S. Forest Service will produce a printout of their records for confirmation of easements before the Prince William Sound Atlas is printed.

2. The Alaska Department of Natural Resources will:

   a. Enter all ANCSA 17(b) easements across private land in Prince William Sound

and the Kodiak Island Borough into GIS using ARC/INFO.

b. Inventory and enter into GIS all roads, trails, docks and airports that provide public access.
c. Edit land ownership coverages.
d. Inventory and enter into GIS all navigable waterbodies.
e. Create 1:63,360-scale maps of the data.
f. Prepare map color separations on an electrostatic plotter.
g. Print and distribute easement atlases.

Phase II - Marking (Lead agency: USFS)
The easements that need to be marked include 45 trails and 37 site easements along the coast of Prince William Sound, 20 roads and trails and 13 sites around the town of Cordova, and 5 trails and 4 sites near Miles Lake. Additional easements are expected to be withheld in pending conveyance documents. About 15 miles of trail and 10 to 12 sites can be completed in a season. In Phase II of this project, the U.S. Forest Service will:

1. Identify conflicts that must be resolved..

2. Verify in the field the usability of easement locations and other proposed resolutions of conflicts.

3. Mark easements, survey them using GPS coordinate system for easy incorporation into GIS datasets, and place signs for public recognition.

C. Schedule

Phase I, identification and mapping of easements, will be completed by the end of FY 95. Phase II, marking easements within Prince William Sound, will begin in FY 96 and continue through FY 98.

Phase I - Identification and Mapping

Prince William Sound	
Confirmation of easements	Nov 94
Color separations to printer	Dec 94
Easement atlas distributed	Jan 95
Kodiak Island Borough/AK Peninsula	
Complete data entry	Feb 95
Complete public/agency meetings	Apr 95
Edit and finalize data	Jun 95
Complete check plots	Jul 95
Color separations to printer	Aug 95
Atlas distributed	Sep 95

Phase II - Marking

Identification of conflicts	FY 95
Field verification	FY 95
Easements marking and surveying	FY 96-98

D. Technical Support

The easement atlases will be printed under contract with a private firm. Estimated csot is $48,000.

E. Location

Atlases will be prepared for Prince William Sound and Kodiak Island Borough. Easements will be marked in Prince William Sound only.

PROJECT IMPLEMENTATION

This project would be implemented by ADNR and the USFS. ADNR maintains GIS datasets for this information and can efficiently and effectively complete the project. The USFS manages most of the ANCSA 17(b) easements in Prince William Sound.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will complement and provide input to the habitat protection process. It will also provide data and information for two projects proposed for FY 95: the Information Management project and the Terrestrial Habitat Protection Project.

FY 95 BUDGET ($K)

		ADNR	USFS	TOTAL
100	Personnel	40.3	30.0	70.3
200	Travel	2.5	3.0	5.5
300	Contractual Services	52.0	10.0	62.0
400	Commodities	0.0	2.0	2.0
500	Equipment	0.0	0.0	0.0
600	Capital Outlay	0.0	0.0	0.0
	Subtotal	94.8	45.0	139.8
	General Administration	9.7	5.2	14.9
	Total Cost	104.5	50.2	154.7

Restoration of the Coghill Lake Sockeye Salmon Stock

Project Number:	95259
Restoration Category:	General Restoration (continuation of 94259)
Proposed By:	ADFG
Cooperating Agency:	USFS
Cost FY 95:	$333,000 (includes $86,600 for data analysis and report writing of FY 94 work)
Cost FY 96:	$325,900
Total Cost:	Unknown
Project Duration:	5 years
Geographic Area of Project:	Prince William Sound
Injured Resource/Service:	Sockeye salmon

INTRODUCTION

This project will restore the natural productivity of Coghill Lake and the resident sockeye salmon (*Oncorhynchus nerka*) population through lake fertilization. Coghill Lake is located on the eastern side of Port Wells in the northwest region of Prince William Sound (PWS). The Coghill Lake sockeye salmon stock historically supported important sport and commercial fisheries. Returns have declined in recent years from a historical average of 250,000 to only 25,000 in 1991. Damage assessment studies on juvenile salmon suggest that the *Exxon Valdez* oil spill may have contributed to the decline of the Coghill sockeye stock. Salmon migration patterns indicate that juvenile sockeye smolt from Coghill Lake likely migrated through oil-contaminated areas in western PWS. Juvenile salmon similar in size to Coghill smolts utilized oiled nearshore nursery habitats. The growth and survival of juvenile salmon utilizing these habitats was reduced by oil contamination from the Exxon Valdez spill. The Coghill Lake stock is presently at dangerously low levels. Action must be taken to restore the stock before any further decline occurs. The communities of Anchorage, Whittier, Valdez, and Cordova will benefit from this project. Coghill Lake sockeye have been heavily utilized by sport fishermen travelling from Whittier by boat and from Anchorage by air. Commercial fishermen from all of these communities have historically fished the Coghill Lake sockeye salmon stock. Restoration of Coghill Lake sockeye salmon will further improve management of important sockeye and chum salmon stocks returning to hatcheries in western PWS.

NEED FOR THE PROJECT

This project will restore an important natural resource and resource service in the *Exxon Valdez* oil-spill area. Restoration of the Coghill sockeye stock will further provide natural resource services to replace those once provided by other injured stocks. Damage assessment studies on juvenile salmon suggest that the *Exxon Valdez* oil spill may have contributed to the decline of the Coghill sockeye stock. Lake fertilization techniques have been successfully applied in Alaska and elsewhere to restore the productivity of sockeye salmon rearing lakes. The production of sockeye salmon populations is closely linked to the productivity of lakes where the fish rear for one to three years. The availability of food in rearing lakes determines the growth and size of smolts that emigrate to sea. Smolt size in turn determines ocean survival and subsequent adult returns. The fry food resources in Coghill Lake are currently very low. As a result, the lake cannot support large numbers of fry, and the smolts are very small. Fertilization is needed to increase lake productivity and boost fry food abundance until natural nutrient input from salmon carcasses is restored.

PROJECT DESCRIPTION

The goal of this project is to restore the natural productivity of Coghill Lake and the resident sockeye salmon population through use of established lake fertilization techniques. The USFS will apply fertilizer to the lake each summer for five years. ADFG will conduct limnological and fisheries studies needed to monitor and refine the fertilization program. These studies will focus on the effects of fertilization on primary and secondary production and the growth and survival of juvenile sockeye salmon in the lake.

A. Objectives

The ADFG component of the project will achieve the following objectives each year:

1. Apply liquid fertilizer to Coghill Lake between June and September,

2. determine the response of lake nutrient levels, primary and secondary production, and plankton species composition to lake fertilization,

3. determine if the prey composition, growth, and overwinter survival of sockeye salmon fry changes in response to lake fertilization, and

4. estimate the effect of fertilization on lake carrying capacity and smolt-to-adult survival.

B. Methods

Objective 1
Lake fertilization is recommended for one sockeye life cycle (5 years) to elevate the

productivity of the lake and the resident sockeye salmon population. A pharmaceutical-grade liquid fertilizer will be applied to the lake by releasing it from a low-flying aircraft. Application will consist of six to nine passes of five-minute duration one day each week. Approximately 3,000 kg of fertilizer will be applied each day. Fertilizer will be applied over the middle third of the lake comprising an area of 3.9 km^2. Twenty-three thousand kilograms of liquid fertilizer (20-5-0) containing 20% nitrogen and 5% phosphorus will be applied from mid-June to August 1. Thirty-one thousand kilograms of nitrogen fertilizer (32-0-0) comprising equal portions of ammonium, nitrate-nitrite, and organic nitrogen will be applied from August 1 to early September. People reserving the cabin at Coghill will be notified of the fertilization schedule. Notices will also be posted in the cabin. Fertilizer will be applied no closer than a mile and a half from the cabin and lagoon where most recreational activity takes place. The pilot will not drop fertilizer in a portion of the application area if anyone is within that area.

Objective 2

Limnological sampling will be conducted twice each month at two stations. Dissolved oxygen concentrations will be measured from the surface to a depth of 40 m. Eight liter water samples will be collected from the 1m stratum, chemocline, and monimolimnion. Replicate vertical zooplankton tows will be taken using a 153-μm mesh conical net. Water samples will be analyzed for the following parameters: conductivity, alkalinity, calcium, magnesium, turbidity, total iron, filterable reactive phosphorus, total phosphorus, nitrate and nitrite, total Kjeldahl nitrogen, total nitrogen, and reactive silicon. Yearly phosphorus loading will be estimated after Vollenweider (1976). Euphotic zone depth and algal standing crop will be estimated after Schindler (1971) and Strickland and Parsons (1972), respectively. Zooplankton abundance will be estimated from triplicate counts of organisms in 1 ml subsamples. Zooplankton dry weight and biomass will be estimated by regression analysis using body length measurements on 10 individuals from each taxa. Light penetration will be measured at 1 m increments from the surface to a depth equivalent to 1% of the subsurface light. Water temperature in the epilimnion and water level will be continuously monitored by electronic recorders moored at 5, 15, and 25 m depth.

Objective 3

The habitats used by sockeye salmon fry in the lake will be determined from visual surveys, beach seine and tow net catches, and hydroacoustic surveys conducted in June, August, and October. A 120-Khz echosounder will be used to determine the vertical distribution of fry in the lake during the day and at night. Twenty samples ($n=10$) of ten sockeye salmon fry will be collected from various habitats during each survey for later analysis of stomach contents and otolith growth.

Stomach analysis will be conducted on sockeye fry collected during each survey. Prey items in the stomach will be identified to the lowest possible taxonomic level. Prey body weight will be estimated by regression analysis using body length measurements on 10 individuals from each taxa. Stomach contents weight will be estimated by the product of abundance and mean body weight for each taxa. Chi-square analysis will be used to test for differences ($P=.05$) in the proportion of stomach contents weight in each taxonomic group between three time periods. Analysis of covariance will be used to test for differences ($P=.05$) in stomach contents weight

between three time periods.

Otolith microstructure analysis will be conducted on sockeye fry (n=200) collected during each survey. Thin sections of the otoliths will be prepared using methods developed by Volk et. al. (1984). A computer image analysis system will be used to collect data from the otoliths. A modified Fraser-Lee back calculation procedure will be used to reconstruct fish growth histories during weekly time periods. Weekly growth estimates obtained from otoliths will be regressed against weekly mean water temperatures obtained from electronic temperature recorders. Analysis of covariance will be used to test for differences (P=.05) in temperature-specific growth between Coghill Lake sockeye and fish fed an excess ration. Comparison of regression slopes will be used to determine if fry growth in Coghill Lake is limited by food abundance. This information will be used to monitor the growth response of the fish to fertilization and determine the carrying capacity of the lake.

The overwinter survival of juvenile sockeye will be estimated from fall fry and spring smolt population estimates. Fall fry population size will be estimated with a 120 Khz echosounder towed along 10 randomly selected transects. A mid-water trawl will be used in conjunction with the hydroacoustic surveys to determine species composition, age, and size of fish targets. Sockeye salmon smolts emigrating from Coghill Lake will be enumerated using incline-plane traps. The traps will be operated continuously from early May through June. The catch efficiency of the traps will be determined by mark/recapture analysis. Age composition and size will be estimated from a sample of 40 smolts collected each day. Chi-square analysis and analysis of variance will be used to test for differences (P=0.05) in age composition and smolt size between years, respectively. A representative sample of smolts will be coded-wire tagged to enable later estimation of smolt-to-adult survival in the commercial fishery. The combined results from these investigations will be compiled in an annual report describing the success of the fertilization program and recommending refinements to the methodology.

Objective 4

The effect of lake fertilization on lake carrying capacity will be evaluated using techniques developed by Koenings and Burkett (1987). The mean annual zooplankton biomass for Coghill Lake will be used as the independent variable in a regression model relating zooplankton biomass in Alaskan lakes to smolt biomass. Actual smolt biomass in Coghill Lake will be compared with expected smolt biomass from the regression model to evaluate growth and mortality of sockeye fry in Coghill Lake. The effect of lake fertilization on smolt-to-adult survival will be also be evaluated using techniques developed by Koenings. The mean size of Coghill Lake smolt will be used as the independent variable in a regression model relating mean smolt size in Alaskan lakes to smolt-to-adult survival. Actual smolt-to-adult survival will be estimated when the fish return as adults one to three years after outmigration.

C. Schedule

This project will be conducted over a five year period which corresponds to the generation time for Coghill Lake sockeye salmon. Lake fertilization is expected to elevate lake productivity until carcasses from adult spawners can once again contribute significantly to the nutrient load in the

lake. Project activities will take place throughout each year.

May - June	Enumerate outmigrant smolts and estimate smolt age and size
June - October	Apply fertilizer each week and conduct limnological sampling
June, Aug., Oct.	Determine fish habitat use and sample for otolith and stomach analysis
October	Estimate fall fry population size using hydroacoustic techniques
June - October	Conduct laboratory analyses of limnological, otolith, and stomach samples
October-Dec.	Analyze data and prepare annual report

D. Technical Support

Hydroacoustic fish abundance estimates in Coghill Lake will be provided by the Prince William Sound Science Center (PWSSC). The staff of the PWSSC have considerable expertise in quantitative hydroacoustic techniques including work at Coghill Lake in FY94. Their continued participation in this project will provide of consistency in hydroacoustic techniques and thus valid interannual comparisons of fry abundance estimates.

E. Location

This project will be conducted at Coghill Lake which is located in northwest PWS on the east shore of Port Wells. The Coghill Lake sockeye salmon population migrates through several fishery districts in western PWS.

PROJECT IMPLEMENTATION

The ADFG will collect field samples of juvenile salmon for this project. The ADFG is responsible for managing the sockeye salmon resource in the PWS area. In addition, the ADFG is responsible for the development, oversight, and evaluation of salmon enhancement projects in PWS. The ADFG has conducted limnological and sockeye salmon smolt studies in Alaska during the past twenty-five years. The PWSSC will conduct hydroacoustic surveys of Coghill Lake to estimate fry abundance. The staff of the PWSSC have considerable expertise in quantitative hydroacoustic techniques including work at Coghill Lake in FY94.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project will be integrated the project Coded-wire Tag Recovery of Other Salmon Species. This project will provide estimates of fishery catches of Coghill Lake sockeye salmon that are needed to estimate the total return of salmon to Coghill Lake and smolt-to-adult survival.

FY 95 BUDGET ($K)

Personnel	127.1
Travel	2.5
Contractual	157.3
Commodities	16.0
Equipment	0.0
Subtotal	302.9
Gen. Admin.	30.1
Total	333.0

Subtidal Monitoring: Recovery of Sediments in the Northeastern Gulf of Alaska

Project Number:	95285-CLO
Restoration Category:	Monitoring (closeout)
Proposed By:	NOAA
Cost FY 95:	$121,000
Cost FY 96:	$0
Total Cost:	$121,000
Duration:	1 year
Geographic Area:	Gulf of Alaska
Injured Resource/Service:	Subtidal organisms

INTRODUCTION

Subtidal sediments were found to be contaminated by oil at five locations in the Gulf of Alaska (GOA) in 1989. Although hydrocarbon contamination was usually confined to shallow sediments (0-3 m) in GOA, sediment contamination reached a depth of 20 m at at least one location (Chugach Bay). Recovery rates of subtidal marine sediments contaminated by petroleum hydrocarbons at the latitude of GOA are poorly known. Recovery to background levels of hydrocarbons in subtidal sediments at the contaminated sites in GOA may be nearing completion. The purpose of this project was to determine the amount of oil remaining in the subtidal environment at the locations formerly contaminated by oil in GOA sediments there and to compare the amount of oil remaining in sediments at those locations with that at comparable locations in Prince William Sound.

This study will provide the first assessment since 1990 of the contamination of subtidal sediments by *Exxon Valdez* oil outside Prince William Sound. The study will provide information on environmental hydrocarbon concentrations of use to the study on subsistence food [Project Identification Number (PIN), 94279] and the clam study (PIN 94081).

NEED FOR THE PROJECT

The resource that will be monitored is subtidal sediments in the bathymetric depth range of 0 to 100 m on the Kenai and Alaska Peninsulas. Demersal fish, benthic invertebrates, certain diving birds and mammals prey on organisms associated with subtidal sediments. Investigators

attempting to restore or monitor recovery of populations of these organisms following the *Exxon Valdez* oil spill will need to know the concentrations of petroleum hydrocarbons present in these sediments.

PROJECT DESCRIPTION

A. Objectives

1. Determine the composition and concentration of petroleum hydrocarbons from the *Exxon Valdez* oil spill in intertidal and subtidal sediments (0-100 m) in the Gulf of Alaska by GC/MS.

2. Compare concentrations of hydrocarbons in subtidal sediments outside Prince William Sound with concentrations at comparable depths inside the Sound.

3. Compare concentrations of hydrocarbons in subtidal sediments outside Prince William Sound in 1994 with concentrations found at the same stations in 1989 and assess the extent of recovery of those sediments.

4. Complete hydrocarbon analysis of sediments collected in Prince William Sound in July 1993.

B. Methods

The methods will be similar to those employed for sediment sampling under the Natural Resource Damage Assessment Subtidal Study Number 1. They are summarized briefly below. Sediment samples will be collected at one intertidal station and five subtidal stations. Intertidal collections will be made at a single tidal height in the range of +1 to -1 m relative to mean lower low water (MLLW) depending on the distribution of fine sediments. Three samples, each a composite of 8 subsamples, collected randomly along a 30 m transect laid parallel to the shoreline will be taken at each intertidal site. These samples will be collected at low tide or by divers.

Subtidal sediment collections will be made at 3, 6, 20, 40 and 100 m below MLLW. Collections at 3, 6 and 20 m will be made by divers on transects laid along the appropriate isobath and sampled in the same way as described above for the intertidal transects. Samples taken at depths below 20 m will be collected with a Smith-McIntyre grab. Three grabs will be taken at each depth. Four subsamples will be removed at randomly selected points within each grab. The subsamples will be combined to form one sample per grab.

All samples collected by hand (including those removed by hand from the Smith-McIntyre grab) will be taken from the surface (top 0-2 cm) of the sediment column. Samples taken by hand in the intertidal region will be collected using a chrome-plated brass core tube (3.6 cm inside diameter) and chrome plated spatula. Each subsample will be transferred to a sample jar using

the spatula. The core tube and the spatula will be washed, dried and rinsed with methylene chloride between samples. Sample jars will be cleaned to EPA specifications for hydrocarbon sampling. The jars will be fitted with teflon lined caps also cleaned to EPA specifications. Samples will be placed in coolers with ice immediately after collection and will be frozen within an hour. Appropriate blanks will be collected at each site. Chain of custody procedures will be followed after collection of all samples.

C. Schedule

Sediment sampling wasl be conducted in July 1994. Chemical analyses will be completed by November 1994. Data compilation and analysis will be completed by March 1995. A progress report will be submitted in November 1994 and a final report will be completed by April 1995.

D. Technical Support

The project will require technical support in hydrocarbon chemistry (UV spectrophotometry and gas chromatography/mass spectrometry). The chemistry will be performed at the Auke Bay Laboratory.

E. Location

This project sampled 7 sites in the Gulf of Alaska (2 reference sites and 5 contaminated sites) and four sites in Prince William Sound (2 reference sites and 2 contaminated sites). The sites were Black Bay, Tonsina Bay, Windy Bay, Chugach Bay, Hallo Bay, Katmai Bay, Wide Bay Moose Lips Bay, Northwest Bay, Olsen Bay and Sleepy Bay. Except for Wide Bay which was sampled only in 1989 all sites were sampled once in 1989 and in 1990 under the NRDA program .

PROJECT IMPLEMENTATION

Name	Responsibility
Stanley Rice	Overall management
Charles O'Clair	Management of data analysis and report writing.
Jeffrey Short	Management of chemical analyses.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The agency will contribute, partially, the management salaries of Rice, O'Clair and Short (~$34K). The project will pay the salaries required for field work, analytical chemistry and data analysis. During the time period October 1, 1993 to September 30, 1994 the agency will complete hydrocarbon analysis, data compilation and analysis and report writing for the field study conducted in Prince William Sound in July 1993.

FY 95 BUDGET ($K)

Personnel	97.9
Travel	3.0
Contractual	0.0
Commodities	5.4
Equipment	0.0
Subtotal	106.3
Gen. Admin.	14.7
Total	121.0

Prince William Sound Pink Salmon Stock Identification and Monitoring Studies (CWT)

Project Number:	95320B
Restoration Category:	General Restoration (continuation of 94320B)
Proposed By:	ADFG
Cost FY 95:	$260,500
Cost FY 96:	$248,600
Total Cost:	$509,100
Duration:	2 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon

INTRODUCTION

In the decade preceding the *Exxon Valdez* Oil Spill (EVOS) production of pink salmon *Oncorhyncus gorbuscha* in Prince William Sound (PWS) ranged from 10 to 15 million fish and represented an important component of the commercial fishery on salmon. Much of the spawning for pink salmon (up to 75% in some years) occurs in intertidal areas. These areas are susceptible to marine contaminants and there is strong evidence the March 24, 1989, *Exxon Valdez* Oil Spill (EVOS) adversely affected spawning success and early marine survival in Prince William Sound.

Salmon populations impacted by the EVOS are heavily exploited in commercial, sport, and subsistence fisheries and their restoration can most effectively be achieved through more sensitive management of the commercial fishery. The populations (stocks) in areas heavily impacted by the EVOS are present in fisheries dominated by hatchery fish. The management of this mixed stock fishery has historically been based on maintaining good temporal and spatial distribution of spawning escapement for groups of stocks in eight major fishing districts. The success of this management strategy relies upon the manager's ability to control stock-specific exploitation rates. Restoration premised on stock - specific management of the commercial fishery will require accurate inseason estimation of the stock composition of the catch if different harvest rates are to be achieved for damaged wild stocks versus hatchery stocks. This project will provide those estimates.

The foundations for this project were firmly established in feasibility studies which were

conducted beginning in 1986 and extending through 1988. During the damage assessment process large scale tagging and recovery projects were instituted and perfected by Natural Resources Damage Assessment (NRDA) Fish/Shellfish (F/S) Study #3 . Damage assessment funds were expended for tagging hatchery releases of pink salmon in 1989 and 1990 and wild populations of pink salmon in 1990 and 1991. Tag recovery efforts for wild and hatchery pink salmon were funded by damage assessment funds in 1989, 1990, and 1991 and by restoration funds in 1992. Following the loss of funds for further tagging of hatchery stocks of pink salmon in 1990, the private non-profit aquaculture associations in Prince William Sound have continued to tag pink salmon releases at their own expense. Prince William Sound Aquaculture Corporation, Valdez Fisheries Development Association, and the Alaska Department of Fish and Game pooled their resources to come up with approximately half of the funds required to field a full fledged pink salmon tag recovery effort in 1993, with the Trustee Council providing matching funds. This proposal is to request the same matching funds for the 1995 season.

NEED FOR THE PROJECT

Populations of wild pink salmon in PWS which were injured by the EVOS continue to experience poor reproductive success. These populations must be protected from other sources of injury or mortality which could further reduce their long term reproductive success.

Adult returns from injured wild populations mingle with other wild and hatchery populations in PWS waters and all are heavily exploited by commercial fisheries. Successful restoration of injured populations will require that they be exploited at a lower rate in these fisheries until their reproductive rates return to historic average levels. Minimizing the exploitation of injured wild populations will insure that sufficient numbers adults from enter streams to spawn. This project provides fisheries managers with real time estimates of the numbers of wild and hatchery fish in commercial harvests. These estimates enable managers to identify areas where exploitation of wild populations can be minimized while permitting the timely harvest of economically important hatchery returns.

PROJECT DESIGN

This project is designed to provide estimates of hatchery and wild fish contributions to commercial and cost recovery fisheries of pink salmon in Prince William Sound. The project is funded by the Alaska Department of Fish and Game, Prince William Sound Aquaculture Corporation, Valdez Fisheries Development Association, and the Oil Spill Trustee Council. The project will be administered and supervised by the Alaska Department of Fish and Game.

A. Objectives

1. Make inseason estimates of the temporal and spatial contributions of tagged hatchery stocks of pink salmon to PWS commercial and hatchery harvests based on the number of tags detected in adipose clipped fish which are recovered during catch sampling;

2. Provide timely in season estimates of hatchery and wild stock contributions to harvests by time and area to fisheries managers;
3. Use data from fully decoded tags recovered from commercial catches, cost recovery harvests, and hatchery brood stock to verify or adjust in season contribution estimates;

4. Estimate marine survival rates for each uniquely coded hatchery release group and;

5. Write a final report which summarizes temporal and spatial distributions of hatchery and wild contributions to commercial and cost recovery harvests in PWS, survival estimates specific to each hatchery release group, and fisheries management actions taken to reduce the exploitation on wild stocks based on in season estimates of the stock composition of fisheries harvests.

B. Methods

Tag recoveries will be made from a stratified random sample. Fisheries will be stratified by district, discrete time segments and processor. For each stratum, 15% of the pink salmon commercial harvest and the cost recovery harvest will be scanned for fish with a missing adipose fin. Catch sampling will be conducted in processing plants located in Cordova, Valdez, Anchorage, Whittier, Kenai and on floating processors. Brood stock sampling will also occur at all 4 PWS pink salmon hatcheries. A minimum of 50% of the daily brood stock requirements at each hatchery will be scanned for fish with missing adipose fins.

In the catch, cost recovery and brood stock samples, the total number of fish scanned and the total number of fish with missing adipose fins will be recorded. The heads of fish with missing adipose fins will be removed, labelled and shipped to the Tag Lab in Juneau for tag removal and decoding. Tag recovery, scanning, and catch data will be merged in a computer data base and returned to Cordova for analysis.

C. Schedule

June 20 - Sept 15, 1995	Tag recoveries in commercial fisheries, cost recovery harvests, and brood stocks. Inseason catch stock composition estimates by time and area for management of commercial and cost recovery fisheries.
Nov 30, 1995	Draft Report
Jan 30, 1996	Final Report

D. Technical Support

ADFG will supply biometrics support to ensure that project methods and data analyses will provide inseason stock contribution estimates at levels of accuracy and precision required for management of wild stocks in PWS.

E. Location

Sampling of salmon catches from commercial and cost recovery fisheries will occur in shore based processing plants in Cordova, Valdez, Whittier, and Kodiak and on floating processors in PWS. Extraction and decoding of tags will be accomplished by the ADFG coded wire tag lab in Juneau. All data analyses will be completed in Cordova with assistance from Anchorage based Alaska Department of Fish and Game biometrics staff.

PROJECT IMPLEMENTATION

This project is applied research which has direct and immediate applications to ADFG's statutory obligation to manage fisheries. Feasibility studies for the massive coded wire tagging and recovery operations required to manage PWS pink salmon were conducted by ADFG and the local, private aquaculture associations for two years prior to the EVOS. These agencies developed the methods described for this project, they have the infra-structure (e.g. the ADFG coded wire tag laboratory) in place for large scale tagging and tag recovery operations, and they are the logical choice for conducting this project.

The project is proposed as a cooperative effort to be funded by the Trustee Council, ADFG, and PWS aquaculture associations. Coded wire tags recovered by this project are presently applied by Prince William Sound Aquaculture Corporation (PWSAC) and Valdez Fisheries Development Association (VFDA) at their expense. The annual cost of tag application by these private non-profit corporations is approximately $160 thousand. Funds provided by the EVOS Trustee Council for tag recovery activities will be matched in part by ADFG, PWSAC and VFDA. Funds from the latter two sources will be conveyed to Alaska Department of Fish and Game through cooperative agreements.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The monitoring, research and restoration objectives of this project are integral to the success of ecosystem research and restoration efforts described by the Sound Ecosystem Assessment (SEA) plan. It is an integral part of a package of proposed projects including the SEA (95320), the Salmon Otolith Marking (95320c), and the Pink Salmon Egg and Alevin Mortality (95191) projects. This project monitors the total returns and survival rates of wild stocks identified as damaged by the Pink Salmon Egg and Alevin Mortality Study (95191) and provides information critical to their restoration. This project provides survival estimates for individual release groups from the Experimental Release component of the SEA proposal. These estimates are critical to

several components of SEA including those investigating:

1. The dependence of pink salmon survival on sea surface temperatures, and other oceanographic features of PWS during the fry and juvenile life stages.

2. The dependence of pink salmon survival on the abundance, size, growth rate, and distribution of pink salmon fry and juveniles and, zooplankton population distribution, abundance, and species composition, and

3. Pink salmon survival in relation to abundance, size, growth rate, and distribution of pink salmon fry and juveniles and the abundance distribution, size, and species composition of predator populations.

This project is also directly linked to the proposed Otolith Marking project . Otolith marking is a logical extension of marking technology which will ultimately replace many of the functions of coded wire tags and provide more accurate and precise estimates of hatchery and wild contributions to salmon catches and escapements in PWS at less expense. However, until otolith marks can be applied, coded wire tagging and recovery projects will continue to provide those estimates.

This project will integrate tender fleet tracking, processor plant logistics, and crew scheduling with existing ADFG salmon port sampling projects. Local aquaculture associations which apply tags as part of study 95320 provide all tagging, fry release, sales harvest, and brood stock data necessary for data analysis. Aquaculture associations also provide room, board, and logistics support for brood stock samplers at their hatcheries. Air charter and boat transportation required to get samplers to remote locations in PWS will be shared with other projects having similar needs.

FY 95 BUDGET ($K)

Personnel	175.1
Travel	12.0
Contractual	26.6
Commodities	14.7
Equipment	4.0
Subtotal	232.4
Gen. Admin.	28.1
Total	160.5

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

Project Number:	95320C
Restoration Category:	General Restoration (continuation of 94320C)
Proposed By:	ADFG
Cost FY 95:	$642,200
Cost FY 96:	Unknown
Total Cost:	Unknown
Duration:	4 years
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon

INTRODUCTION

Each year approximately one half billion wild pink salmon fry emerge from the streams of Prince William Sound (PWS) and migrate seaward. Adult returns of wild pink salmon to PWS averaged approximately 10 million fish annually over the last two decades. The huge fry outmigrations and subsequent adult returns of pink salmon play major roles in the Prince William Sound (PWS) ecosystem. Both juveniles and adults are important sources of food for many fish, birds, and mammals. Adults returning from the high seas also convey needed nutrients and minerals from the marine ecosystem to estuaries, freshwater streams, and terrestrial ecosystems. Wild pink salmon also play a major role in the economy of PWS because of their contribution to commercial, sport, and subsistence fisheries in the area.

PWS pink salmon returns originating from brood years subsequent to the EVOS have been aberrant or weak. Returns of wild and hatchery pink salmon in 1991 were only slightly below the mid-point of the pre-season forecast but arrived late and had very compressed run timing. The fish were also small and in advanced stages of sexual maturity long before reaching their natal streams. As a result of this small size and advanced maturity, the fish were of little commercial value. Returns of pink salmon in 1992 and 1993 were far fewer than expected. The 1992 return of wild pink salmon was the fourth smallest even year return in the last 30 years and the hatchery return was less than one third of expected. The 1993 return of wild pink salmon was the third smallest in the last 30 years and the hatchery return was less than one fifth of expected.

Pink salmon returns to PWS are dominated by hatchery produced fish. In addition to their dominance in the catch, hatchery stocks may also complicate management of PWS fisheries by straying into streams and spawning with wild fish. The magnitude and range of straying by both hatchery and wild pink salmon stocks in PWS may significantly influence the success or failure of restoration efforts directed at wild stocks. The definition of what constitutes a wild population and the scale of restoration efforts may change if significant straying also occurs among wild populations. If straying of hatchery fish is significant and does lower the fitness of wild populations, restoration efforts which concentrate on insuring that spawning escapement goals are met may fail if no attention is given to the origins of the escapement.

Coded wire tags have been the tool of choice for applying unique marks to populations of pink salmon in PWS. The methodology has been used extensively to estimate hatchery and wild stock contributions to commercial harvests and has also been used in preliminary straying research. Despite its usefulness, there are drawbacks to coded wire tag technology. Approximately 1 million coded-wire tags must be applied to pink salmon fry each year to obtain catch contribution estimates for returning adults. Tagging and recovery are both very labor intensive and the number of tags applied and recovered are sometimes inadequate for the levels of accuracy and precision desired. Coded wire tags are also intrusive, tags can be shed, and tagging may affect subsequent survival. Tag loss through shedding and differential mortality of tagged individuals affects subsequent estimates of adult returns based on tag recoveries. There is also recent evidence that poor placement of coded-wire tags may cause salmon to stray.

Because of the cost and problems associated with coded wire technology, other alternatives for marking larger portions of populations with relatively inexpensive non-intrusive methods must be investigated. By marking most or all of the fish in a population, sample sizes at the time of tag recovery can be much smaller without affecting the accuracy and precision of contribution estimates. Non-intrusive marks which cannot be shed and which do not affect survival or behavior will eliminate important sources of error in mark-recapture population and straying rate estimates.

NEED FOR THE PROJECT

Development of a precise and less expensive stock separation tool will benefit wild salmon. Fishery managers will obtain a more powerful tool for use in reducing fishery exploitation on damaged wild stocks. The reduced cost of otolith marking compared with coded-wire tagging will allow restoration of salmon stocks with less impact on funds available for other species. The technique will initially be developed for pink salmon in Prince William Sound, but will likely be used for other salmon species in the EVOS impact area in the future. The communities of Homer, Seward, Valdez, and Cordova will be most affected by this project, since the economy in these communities is based on the salmon resource.

The tetracycline marking component of this project is designed to test the feasibility of a potentially powerful research and monitoring tool for wild populations of salmon in PWS. Wild populations of salmon are vital to the health of the marine, freshwater, and terrestrial portions

of the PWS ecosystem and to the fishing industry which is the cornerstone of the area economy.

PROJECT DESCRIPTION

This project will develop otolith mass marking as an inseason stock separation tool for salmon. This data is essential information used by fishery managers to reduce fishery exploitation rates on damaged wild salmon stocks. Coded-wire tags are presently used for this purpose, but otolith marking is expected to provide more accurate information at a lower cost. Recognizing the need to develop mass marking technology for pink salmon in PWS, the Alaska Department of Fish and Game (ADFG) and Prince William Sound Aquaculture Corporation (PWSAC) reviewed the feasibility of otolith thermal marking at PWS hatcheries as well as otolith recovery in the commercial fisheries.

Otoliths are small bones in the inner ear of fish. These bones can be marked through systematic changes in water temperature during egg incubation. The resulting marks are bands of light and dark material in the otolith similar to the bands in a tree. These induced marks can be used to identify hatchery-produced salmon in the fishery. Because all hatchery-produced salmon are marked using this technique, the cost of catch sampling is expected to be reduced, and the precision of inseason stock composition estimates are expected to be improved.

This project will be conducted cooperatively by the ADFG, PWSAC, and Valdez Fisheries Development Association (VFDA). In 1994, PWSAC and VFDA will install the necessary equipment and otolith mark all pink salmon embryos in the Armin F. Koernig (AKF), Wally H. Noerenberg (WHN), Cannery Creek (CCH), and Solomon Gulch (SGH) hatcheries. The equipment will be installed in the summer of 1994, and marking will begin after the embryos have passed the eyed stage of development. Heated water will be introduced at the hatchery head troughs allowing treatment of millions of pink salmon embryos simultaneously.
The project will be conducted over two pink salmon lifecycles, marking both odd- and even-broodline fish. This approach is necessary because (1) 35% and 75% of odd- and even-broodline spawners utilize intertidal habitats, respectively, and (2) experience with two complete lifecycles is needed to fully develop a program that integrates induced banding code quality, otolith processing rates and costs, and statistical designs for catch sampling. Cyclic temperature changes in salmon redds associated with the semi-diurnal tide produce natural otolith banding patterns in intertidal-spawning pink salmon. Embryos rearing in upstream redds are exposed to less regular stream temperature changes. Interannual differences in the proportion of upstream and intertidal spawners and natural stream temperature flucuations may produce very different natural otolith banding patterns in wild pink salmon populations in different years. It is essential that the relationship between wild salmon otolith banding patterns, induced otolith banding-code quality, otolith processing rates, and catch sampling design be fully integrated in the program. The quality of induced otolith banding-codes and natural banding patterns in wild populations will affect the ability of otolith readers to identify 'marked' fish. A reduction in the reader's ability to identify marked fish will affect the sample sizes needed to estimate stock composition, the total cost of otolith processing, and ultimately the efficacy of the program.

The feasibility and cost-effectiveness of sampling the commercial catch for otoliths will depend upon whether a representative sample can be collected from the fishery. Estimation of stock composition in commercial catches has always been important for effective fisheries management. Several sampling techniques will be evaluated in 1995 using fin-clip experiments to determine if a truly random sample is obtained from each tender load.

When otolith marked fish return as adults in 1996 and 1997, approximately 13,000 pink salmon otoliths will be processed in each year to estimate stock composition and corresponding confidence levels in PWS fisheries. The catch sampling program will also evaluate the variation in stock composition among tenders as well as between processors. A cost function for catch sampling will also be developed. This information will be used to produce an optimum allocation of sampling resources among tenders and processors. Monte Carlo simulation techniques will be used in conjunction with the data collected in this study to assess sampling power and refine sample sizes.

The ADFG Otolith Laboratory has the expertise required to rapidly process large numbers of otoliths. Approximately 250 otoliths can be processed and decoded by a single experienced technician within a working day. In 1993, the Otolith Laboratory processed 2,300 otoliths. These otoliths were recovered from Hawk Inlet commercial fishery catches and were used to estimate pink salmon contributions from the Gastineau Hatchery operated by DIPAC near Juneau.

A component of this study (*objective 4*) is designed to test the feasibility of chemically marking fish otoliths or skeletal parts by short term immersion in a dilute solution of tetracycline during the embryo or emergent fry life stages. Tetracycline has been used very successfully to apply chemical marks in many other fish species. Tetracycline is now regularly permitted by the United States Food and Drug Administration (FDA) for use as an antibiotic and otolith marking agent on fish destined for human consumption. Marks from tetracycline are permanent, relatively easy to apply, easily recognizable, and at low dosages do not appear to be alter fish survival. While the most widely reported means of applying tetracycline is by feeding, several investigators have reported successful marking of fish species by immersion in dilute solutions of the chemical. Spot and pinfish, coregonids, and striped bass, have all been successfully marked using immersion methods. There are less documented instances of pink and chum salmon having been successfully marked by immersion as well. While probably not cost effective for large hatchery releases reared in massive flow through incubator systems, tetracycline immersion is an attractive alternative for marking much smaller wild populations of pink salmon as the migrate out of their natal streams as fry. Marking the total fry population in a stream provides an accurate and precise tool for estimating total adult returns and survival. As a non-intrusive method which does not appear to alter fish behavior, chemical otolith marking may also provides a powerful tool for investigating straying among wild populations.

A. Objectives

1. Develop engineering designs and install otolith thermal marking equipment in the AFK, WHN, CCH, and SGH hatcheries.

2. Apply otolith thermal marks to all pink salmon embryos rearing in the AFK, WHN, CCH, and SGH hatcheries.

3. Collect voucher samples and evaluate the quality of otolith thermal marks applied to pink salmon embryos at AFK, WHN, CCH, and SGH hatcheries.

4. Identify a feasible methodology for otolith marking wild pink salmon outmigrant fry using tetracycline.

   a. Test and refine remote field camp methods and equipment to be used for immersing wild pink salmon fry in tetracycline solutions for up to 18 hours at varying temperatures,
   b. determine the minimum immersion time and temperature of pink salmon fry in tetracycline solution to insure that otoliths from 100% of the individuals immersed have a unique fluorescent tetracycline mark which is distinguishable from otoliths selected randomly from a pool of individuals which are not immersed,
   c. compare short term growth and survival among pink fry which are treated with tetracycline following capture versus those which are not.

B. Methods

Objective 1

Project concept designs will be developed for water heating systems at AFK, WHN, CCH, and SGH hatcheries. Key physical constraints and biological parameters considered in development of the designs will include: (1) the hatchery floor plan and incubation water system, (2) historic pink salmon development and water temperature data, (3) current equipment on site, (4) approximate thermal marking schedule, and (5) an assumed temperature increase of 3.5° C at each incubator. It is expected that the equipment needed for water heating will be installed in a module attached to the outside of each hatchery. This approach will eliminate the need to take up valuable space within each hatchery for thermal marking equipment. Concept designs will include a boiler with a self-contained glycol system and heat exchanger housed in a portable skid-mounted covered module. Fuel, water, and electricity will be provided to each thermal marking module. Designs for plumbing and electrical installation will vary among hatcheries due to differences in the utility configuration at each site.

Otolith marking technology has been developed at the Gastineau Hatchery operated by DIPAC in Juneau, Alaska. The DIPAC thermal marking system has been successfully used to mark 120 million pink and chum salmon embryos in the hatchery. The DIPAC system cannot mark all embryos simultaneously, but the hatchery operators have worked around the limitations to produce quality thermal marks. The experience gained at DIPAC will facilitate successful development of thermal marking technology at PWS hatcheries.

Pink salmon will be marked during the egg-to-hatch stage at PWS hatcheries. This approach will eliminate the need to degass the incubation water. Gas saturation is usually not a problem for salmon embryos prior to hatch. Salmon eggs maintain a positive internal pressure which

allows them to tolerate total dissolved gases (TDG) up to 110-116%. It would be uncommon to have TDGs of greater than 110% in incubation process water, but it may be possible to drive TDGs this high through aggressive heating. TDGs will be monitored during the thermal marking process. After hatch, gas supersaturation may cause salmon alevins to develop gas bubble disease. Expensive degassing equipment would be required to otolith mark pink salmon alevins.

Objective 2

A unique otolith thermal banding code will be used for each pink salmon hatchery in PWS. A unique hatchery mark will provide consistency in both application and recovery of the mark. The thermal mark will be applied in the eyed-egg to hatch zone of the otolith. The eyed-egg to hatch window occurs between October and December with an average length of 35 days. Approximately 22 days will be required to apply the thermal banding code at each hatchery. The hatchery-specific codes will be composed of 5-7 thermal rings (Table 1). A single code for each hatchery will allow estimation of survival rate by hatchery. However, hatchery operators may also need to estimate survival rate for three treatment groups within each hatchery. In this case, a treatment-group code composed of three thermal rings will be applied in addition to the hatchery-specific basemark to distinguish among treatment groups.

Table 1: Proposed basemarks for PWS pink salmon hatcheries. The thermal schedule describes the actual temperature regime. The letter "H" refers to the relatively Hot water, and "C" refers to Cold; the difference between the two temperature levels being 3.5 degrees Centigrade. The number directly before the thermal level is the number of rearing-hours at that level. Numbers in parenthesis before an "X" denote the number of repetitions.

Facility	Thermal Schedule	Banding Pattern
Cannery Cr.	(3X)48H:24C,(1X)96H:24C,(3X)48H:24C	**III IIII**
WHN	(4X)48H:24C,(1X)96H:24C,(2X)48H:24C	**IIII III**
AFK	(5X)48H:24C	**IIIII**
VFDA	(7X)48H:24C	**IIIIIII**

Objective 3

Quality control during mark application is an important part of the otolith thermal marking program. Quality control is related to mark decoding, since it will largely determine a reader's ability to properly identify the mark. The placement of the thermal banding code on the otolith is critical to mark quality. The banding code will be applied by lot (group of eggs taken on a

single day) or groups of lots, when the embryos are at the appropriate stage of development. Each incubating appliance will be sampled to ensure the mark was correctly applied. We expect that developmental stage and thus basemark placement will differ among lots within the hatchery. Temperature recorders will be installed at various points in the incubation system during mark application to document temperature changes.

A stratified-random sampling design will be employed to estimate the proportion of unmarked otoliths at each PWS pink salmon hatchery. One month after mark application, a random sample of alevins will be taken from each lot, preserved in 100% ethanol, and sent to the ADFG Otolith Laboratory in Juneau. Sample sizes will be selected in proportion to lot size, but a minimum of 100 alevins will be taken from each lot. At least thirty alevins will also be collected from each of 20 streams during the annual pre-emergent fry survey conducted by ADFG. The samples will be used initially to validate that each hatchery-specific code was properly applied. Blind tests will then be conducted to estimate the proportion of alevins marked at each hatchery. A reader's ability to distinguish hatchery-specific codes, and marked otoliths among unmarked otoliths will used to determine the proportion marked. The set of otoliths for the blind tests will be obtained from a random subsample of alevins (n=300) taken from each hatchery sample combined with 600 wild alevins (total 1800 otoliths). Samples from all sources will be randomly combined to construct six test sets of otoliths (n=300). This test design will result in a composition of otolith types very similar to that encountered in samples taken from the commercial fishery when the fish return as adults. Two blind tests will be conducted with each of three readers.

Blind tests will be conducted at the ADFG Otolith Laboratory in Juneau. After the otoliths are extracted from the alevins, they will be fixed to a glass slide with thermo-plastic cement. A grinding wheel will be used to remove material from one side of the otolith and expose the internal structures. The depth of grinding will be monitored by repeated viewing under a dissecting microscope. After the internal bands are exposed, the thermal mark will be decoded under a compound microscope.

Objective 4

Marking feasibility studies will be conducted adjacent to the Prince William Sound Aquaculture Corporation Cannery Creek Hatchery in Unakwik Inlet, PWS, using equipment identical to that proposed for future field camp use. Fry for the study will be donated by the hatchery.

a. Testing Marking Procedures

A buffered solution of tetracycline hydrochloride (Tetra-bac) diluted to 400 parts per million in fresh water will be used to mark all treatment groups in this experiment. Although lessor dosages have been successfully used for some warm water species, this dose has been used with success in chum salmon. Emergent hatchery pink salmon fry immersed in this dose for 24 hours during a small test conducted by the Cordova ADFG staff in the March of 1994 had no short term mortalities and exhibited no signs of stress during exposure. Short also reported that results improved to a point with increasing temperature and length of immersion. This study will test 12 unique combinations (t_{ij}) of immersion time (i) and temperature (j). Immersion

times of 3, 6, 12 and 18 hours (i = 1,2, 3, and 4) will be tested at 2°, 5°, and 8° C (j = 1,2, and 3). There will be five replicates (r = 1,2,3,4, and 5) for each t_{ij}.

Sharr et al. (1994c) observed as many as 50,000 fry migrating daily from moderate sized pink salmon streams during tagging and enumeration studies conducted in PWS in 1990 and 1991 as part of NRDA F/S Study 3 . Larger streams having peak daily fry outmigrations of 100,000 fish per day may be considered for enumeration and tagging studies if otolith marking proves to be feasible. Projections of costs and logistics constraints indicate that heating water and loading densities for immersion baths will be the factors which define the upper limit of chemical otolith marking at a remote field camp. Present projections for fry handling and personnel time as well as fuel and camp supply needs indicate that a typical two person crew at a remote fry enumeration camp can heat approximately 540 liters of tetracycline solution daily for marking fry. Under these constraints, loading densities of approximately 2,500 fry per treatment bag (approximately 180 fry per liter) must be possible if 100,000 fry are to be marked daily. Local aquaculture associations use loading densities as high as 320 fry per liter of aerated water for fry transport operations. It is likely that loading densities that high will result in significant mortalities among fry in a heated tetracycline immersion bath but it is assumed that the required densities of 180 fry per liter can be maintained. This experiment will also test that assumption.

Three 750 liter water baths, one for each temperature treatment, will be prepared in large insulated fish totes. Water will be heated and maintained at temperature by thermostatically controlled electric immersion heaters supplied by a gasoline powered generator. Fry emerging from hatchery incubators will initially be divided into 60 groups (12 treatments x 5 replicates) of 600 individuals each. Each 600 fish group will be placed in a clear polyethylene bag containing four liters of hatchery (stream) water at ambient stream temperature. Compressed air will be supplied to each bag via air stones to insure that fry receive adequate oxygen. A pre-mixed 135 ml. buffered tetracycline solution prepared by dissolving 2.25g of Tetra-bac and 2.0g dibasic sodium phosphate in 135ml of warm (~30°C) fresh water will be cooled to stream temperature and added to the each of 60 treatment bags. Fifteen additional bags will be left untreated and used for controls (c_{ij}) to test the effects of tetracycline on survival at different temperatures and exposure times. Treatment bags and control bags will be transferred in equal numbers to each of the three heated water baths. The water temperature in treatments bags will be monitored and when all bags in a tote have reached the desired immersion temperature, timing for duration of immersion will begin. At the endpoints of each time treatment, five treatment bags will be removed from each of the three totes, transferred to a saltwater enclosure in front of the hatchery and allowed to cool to ambient seawater temperature. Fry from each bag will then be transferred to separate saltwater rearing cylinders constructed of fine meshed plastic screen (vexar). In addition, at the start of the treatment day fifteen groups of 600 fry each will be transferred directly from the hatchery into saltwater rearing cylinders. These fry will act as controls for testing the marking effectiveness of each of the 12 treatments. All treatment and control groups will be held and fed in saltwater rearing pens for four weeks to insure that the treatment band is deposited on the otolith and that otolith growth occurs beyond the marking band. At the end of four weeks, fry from each rearing cylinder which represent one replicate of a treatment group will be transferred to a light proof black plastic bottle containing 90 % ethyl

alcohol and shipped to the Alaska Department of Fish and Game Otolith Processing Laboratory in Juneau (Otolith Lab) for otolith removal and processing.

b. Determining the Minimum Required Treatment

If otolith marked wild populations are to be considered as being representative of other unmarked wild populations then one important criteria for marking success should be that application of the mark does not significantly affect survival. The number of mortalities in each 600 fish treatment and control group will be enumerated for the treatment and rearing periods and totaled. A one way analysis of variance will be used to test for total mortality differences between each treatment group and their corresponding control. Any treatment which has total mortalities significantly greater than those observed in the corresponding control group will be eliminated from further consideration as a potential marking treatment.

All otolith extractions and processing will be completed by the Otolith Lab. Initially a random sample of 30 otoliths from the first replicate of the maximum treatment group (18 hours at 8° C) will be mounted and processed to determine if the maximum treatment resulted in a tetracycline mark. If some or all of the 30 otoliths examined bear no mark it will be assumed that lesser treatments are equally or more ineffective, that tetracycline marking procedures tested are not effective, and that the experiment should be terminated with no further expenditure of funds for otolith processing. If all 30 otoliths are marked then a systematic search will be initiated to find the minimum treatment required to insure that a recognizable mark is produced in 100 percent of the individuals treated.

The systematic search for the minimum required treatment from among those having no effect on survival will proceed according to the following steps:

(1) 30 otoliths from each replicate of t_{11} will be processed and examined by a trained observer.
(2) If all 30 are marked, 30 more otoliths from the first replicate t_{111} will be extracted, mounted on slides then randomly mixed with 30 similarly prepared otoliths from the control group of fish c_0. The trained observer will examine this pool of 60 otoliths and attempt to correctly identify the treated individuals.
(3) If the observer correctly identifies all of the treated individuals from a pool of t_{111} and c_0, the procedure in step (2) will be repeated three more times for similar t_{111}, t_{112}, t_{113}, t_{114}, t_{115} and control pools.
(4) If at any point in these tests the observer fails to detect a mark on an otolith which has been treated, the procedure will terminate for $i=1$ and begin anew at step (1) for $i=2$ through 4.
(5) If the observer fails to classify any time treatments of temperature $j=1$ with 100 percent accuracy the steps (1) through (4) will be repeated for treatments t_{12} through t_{34}.
(6) At the first instance of the observer correctly identifying all marked individuals in all replicates for a treatment t_{ij} it will be determined that this is the minimum treatment suitable for marking.

Subsequent to identifying the minimum suitable treatment, 30 otoliths from each of the first replicates of each remaining untested treatment group which had no significant mortalities may be examined to determine if more readily identifiable marks available and if accidentally elevated temperature in the field may adversely affect marking. If a more readily identifiable mark is identified, steps one through three list above will be repeated for that treatment. If 100 percent classification accuracy is achieved by the observer for all replicates of the treatment, this new treatment will be designated as the minimum treatment of choice and the former selected treatment will become the alternate treatment of choice. The decision as to which to use in future field studies will based upon which had the lowest mortality rate during treatment and subsequent rearing.

c. Testing Effects of Tetracycline

If results of the marking study indicate that tetracycline is a suitable marking agent for use on wild pink salmon an FDA permit will be acquired for use in future years when marked fish are to be released. As part of the permit, the FDA stipulates that investigators must contribute to furthering the knowledge about the biological effects of tetracycline. Typically they require that a set of controls be maintained for each treatment application of the chemical and that results of treatments and controls be compared. Because fry are not being released, these comparisons are not required for this feasibility study. However, they can be done at no additional cost and by doing them, we may facilitate obtaining future permits when fish are to be released.

Mortalities from each of the treatment controls (c_{ij}) which were held in fresh water but subject to time and temperature treatments will be enumerated and totaled for the treatment and rearing phases of the experiment. A one way analysis of variance will be used to test for significant differences between mortalities observed among controls and those observed in the corresponding treatment groups immersed in tetracycline (t_{ijr}).

C. Schedule

This project will be conducted over one pink salmon life cycle for both the odd- and even-broodline populations. Embryos will be otolith marked in the fall of 1994 and 1995. The adult fish from the 1994 and 1995 year classes will return to PWS as adults in the summers of 1996 and 1998.

Table 2: Schedule of activities for otolith thermal marking program over the duration of the project (FY 1994-1997).

Date	Activity
2/94- 8/94	Install water heating equipment at PWS pink salmon hatcheries
10/94-12/94	Apply otolith banding codes to even-broodline embryos at hatcheries
2/95- 4/95	Apply coded-wire tags to even-broodline pink salmon fry at hatcheries
4/1/95	Submit annual project report for FY 1994
7/95- 9/95	Develop a method to collect random otolith samples from tender boats

10/95-12/95	Apply otolith banding codes to odd-broodline embryos at hatcheries
2/96- 4/96	Apply coded-wire tags to odd-broodline pink salmon fry at hatcheries
4/1/96	Submit annual project report for FY 1995
8/96-10/96	Recover thermally marked even-broodline adults from the commercial fishery
8/96-12/96	Determine optimal allocation of sampling effort and refine sample sizes
4/1/97	Submit annual project report for FY 1996
8/97-10/97	Recover thermally marked odd-broodline adults from the commercial fishery
8/97-12/97	Re-evaluate optimal allocation of sampling effort and sample size estimates
4/1/98	Submit annual project report for FY 1997

Table 3: Schedule of activities for tetracycline marking component in 1994.

Dates	Activity
4/5 - 5/5	Apparatus set up at Cannery Creek Hatchery, marking immersion treatments, and rearing of treatments and controls
5/5 - 5/15	Dismantle and remove equipment at Cannery Creek and ship otolith samples to Otolith Lab
5/15 - 9/15	Process otoliths at Otolith Lab
4/1/95	Submit annual project report for FY 1994

D. Technical Support

Data archiving services will be required to insure that all information obtained from this project is adequately documented and catalogued. The ADFG Commercial Fisheries Management and Development Division will provide biometrics support for review of project methods and data analyses. The ADFG Otolith Laboratory will supply otolith mass processing expertise.

E. Location

This project will be conducted in the PWS region. Embryos will be thermally marked at the AFK, WHN, CCH, and SGH hatcheries operated by the PWSAC and VFDA. Otolith code development and quality control work will be conducted at the ADF&G Otolith Laboratory in Juneau. In future years, an otolith catch sampling program will be developed. Catch sampling will likely occur in all PWS communities, as well as, Anchorage, Kenai, and Kodiak. Data analyses and reporting will be completed by ADF&G staff in Cordova and Anchorage. The tetracycline marking component of the project will be conducted at the CCH Hatchery.

PROJECT IMPLEMENTATION

The ADFG will oversee installation of thermal marking equipment in PWS hatcheries and develop otolith catch sampling designs. The ADFG is responsible for managing the pink salmon resource in the PWS area. In addition, the ADFG is responsible for the development, oversight, and evaluation of the salmon enhancement program. The ADFG has considerable experience in large-scale fish marking programs including the PWS coded-wire tag program. The existing ADFG fishery management program in PWS will provide salmon catch data needed to complete this project. The PWSAC and VFDA will install and operate otolith thermal marking equipment at four pink salmon hatcheries in PWS. These organizations are the operators of these facilities.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The Otolith Mass Marking Project (94187) will be highly integrated with several other salmon restoration projects in PWS. This project will complement the Sound Ecosystem Assessment (SEA) program (Project 94320). SEA is a multi-disciplinary program designed to develop an understanding of the mechanisms regulating ecosystem function in PWS. During its first year, SEA will focus on the interactions of pink salmon and herring with other components of the PWS ecosystem. Otolith marked fish will provide a valuable tool for examining interactions between wild and hatchery salmon during the early marine period. The Salmon Growth component of SEA will utilize otolith marked juvenile pink salmon to (1) evaluate habitat overlap between wild and hatchery salmon, (2) compare size composition of wild and hatchery salmon in mixed schools, and (3) develop a tagging program to estimate juvenile salmon mortality within PWS and in the Gulf of Alaska. The Salmon Predation component of SEA will utilize otolith marked juvenile salmon to determine if predators select wild or hatchery salmon. Projects 94185 (Wild Salmon Straying) and 94192 (Hatchery Salmon Straying) were deferred in 1994 to allow for development of otolith thermal marking and tetracycline marking technologies in PWS. Without the availability of a non-intrusive mass marking methodology it is unlikely that reliable estimates of total return, survival, and straying rates for wild salmon populations would be possible. Therefore, the monitoring, research and restoration objectives of this project are related to several other projects including the Pink Salmon Genetics project (94189), and the Pink Salmon Egg and Alevin Mortality (94191) projects.

FY 95 BUDGET ($K)

Personnel	25.7
Travel	1.6
Contractual	568.6
Commodities	10.4
Equipment	8.2
Subtotal	614.5
Gen. Admin.	27.7
Total	642.2

Purchase of Isotope Radio Mass Spectrometer

Project Number:	94320I(3)
Restoration Category:	Research
Proposed By:	University of Alaska Water Research Center, Inst. of Northern Engineering
Lead Trustee Agency:	ADFG
Cost FY 95:	$257,400
Cost FY 96:	$0
Total Cost:	$257,400
Duration:	1 year
Geographic Area:	Prince William Sound
Injured Resource/Service:	Multiple resources

INTRODUCTION

The increased demand for stable isotope ratio analyses associated with studies of ecosystem dynamics in Prince William Sound has currently filled our analytical capabilities almost to capacity. Projected demands for the FY95 year and beyond indicate that a major increase will occur in the number of samples associated with oil-spill related studies. This may mean substantial delays in data acquisition even if no serious machine breakdowns or personnel problems occur. The sample load from the SEA projects coupled with other proposed studies by both the Prince William Sound Science Center and the research institutes at the UAF indicate that a substantial increase in load in the order of several thousand samples will occur next year.

PROJECT DESCRIPTION

This proposal seeks funds to purchase a Europa isotope ratio mass spectrometer and support a technician to accomplish the projected analysis load in a timely fashion and to provide a buffer in case of a serious machine breakdown or personnel delays with our current system. The system proposed for purchase will analyze carbon and nitrogen isotope ratios simultaneously

and will allow efficiency of operation through the use of common components. We currently operate a Europa ANCA 20/20 machine and will aim at acquiring a similar piece of equipment.

We are also requesting funds for a technician to operate the equipment. Our mass spectrometer technician, N. Haubenstock, is fully occupied in keeping the current equipment operational and with sample processing, data entry and associated tasks. She would be unable to maintain and operate two machines simultaneously without technical assistance. The enclosed budget provides for that assistance.

We propose to house the system in the Water Research Center as part of the UAF Stable Isotope Ratio Mass Spectrometry Facility. The Water Research Center has room in the air conditioned laboratory to house the instrument and the required regulated power and ancillary facilities such as a sample preparation laboratory.

We request the funds to purchase a Europa automated mass spectrometry system complete with automated sample combustion system and the data handling capabilities. The price quoted for this system is approximately $145,000 with an additional $15,000 requested for the start-up materials including a Cahn electromicrobalance, high-purity gases, additional primary standards and a small bench-top grinder for homogenizing samples.

We identify this equipment in order to take advantage of a consolidated supply of spare parts and expendables and, more importantly, the accumulated knowledge of operational details gained over the past years with our present Europa system.

The mass spectrometer will be operated as part of the UAF Stable Isotope Mass Spectrometry Facility which is jointly supported by the Water Research Center, Institute of Northern Engineering and the Institute of Marine Science. We have successfully operated this facility since 1985 and steadily expanded our services and capacity to the University community. The proposed instrument is anticipated to be fully occupied with samples generated by the SEA project and related EVOS Trustee Council-funded studies. There will be no singular dedication of the machine to these samples as all samples are run in order of receipt and by sample type. Set-up for a particular sample type will include all incoming compatible samples on that machine. Analysis fees will be charged for all samples as they reflect usage of expendables (high purity oxygen and helium, replacement combustion tubes, combustion tube packing, computer supplies, sample cups, etc.). They do not reflect operator costs which are budgeted separately.

SCHEDULE

1 Nov	Order mass spectrometry system
15 Feb	Anticipated receipt and installation

1 Mar and continuing	Attain operational status and commence isotope ratio analyses on samples

FY 95 BUDGET ($K)

Personnel	45.3
Travel	0.0
Contractual	0.2
Commodities	5.0
Equipment	164.0
Subtotal	214.5
Overhead	42.9
Total	257.4

PWSAC - Experimental Fry Release

Project Number:	95320K
Restoration Category:	Research (continuation of 94320K)
Proposed By:	Prince William Sound Aquaculture Corporation
Lead Trustee Agency:	ADFG
Cost FY 95:	$47,300
Cost FY 96:	$53,400
Total Cost:	Unknown
Duration:	Unknown
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon

INTRODUCTION

Pink salmon hatcheries operated by the Prince William Sound Aquaculture Corporation annually release approximately 400 million pink salmon fry from three hatcheries located in the northern, northwestern, and southwestern corners of Prince William Sound. The fact that release timing, release location, size at release and number released per day can be controlled makes the hatchery pink salmon attractive as an experimental tool. The Sound Ecosystem Assessment (SEA) program advocates that experimental releases of hatchery juveniles will provide a powerful test of the influence of ocean-entry timing and of fry size at ocean entry on losses to predators.

NEED FOR THE PROJECT

SEA focuses on processes and mechanisms that regulate losses of fry and juveniles to predators after emergence from nearshore natal habitats. Research suggests that fry size is an important determinant of survival during early marine residence. The pink salmon fry release project supports **SEA** research to investigate this hypothesis.

PROJECT DESIGN

A. Objectives

1. Rear 8 million early emerging fry each at the Wally Noerenberg Hatchery (WNH) on Esther Island and Armin F. Koernig Hatchery (AFK) on Evans Island to 1.5 gram live weight for release in mid-June.

2. Determine the marine survivals of fry in experimental releases from coded wire-tagged individuals recovered in the brood stocks and common property fishery the following year.

3. Compare the marine survivals of late released larger fry with other releases at these same hatcheries.

B. Methods

AFK and WNH hatchery pink salmon fry begin exiting the incubators volitionally at an average weight of 0.23 grams in mid March. Following enumeration, the pink fry are conveyed to saltwater rearing pens. Approximately 8 million fry will be loaded in two rearing pens of 4 million each at the two hatchery locations. Coded Wire Tags (CWT) will be applied to approximately 1 out of every 200 fry in the experimental groups.

All fry will be fed a standard commercial diet of soft semi-moist fish food during the 75-85 days prior to release. Releases will occur simultaneously at the two facilities on or about June 15 when the fry are expected to have attained an average live weight of 1.5 grams. Routine reports on the rearing status of the fry as well as final release information will be communicated to **SEA** biologists on board trawl and purse seine vessels to assure nearshore and open water sampling is targeted on released fry.

C. Schedule

Feb 1995-Apr 1995: Oversee development of incubating pink salmon eggs and perform routine eggcare and incubation environment monitoring.
Mar 1995-Jun 1995: Enumerate, CWT, rear and release pink salmon fry.
Apr 1995-Jun 1995: Coordinate/communicate rearing and release of hatchery pink salmon fry with **SEA** research team.

D. Technical Support

The PWSAC salmon program receives technical support from permitting agencies, University of Alaska Fairbanks, University of Alaska Juneau, and PWS Science Center. The ADFG pathology lab, genetics lab, and coded wire tag lab are among specific expertise areas overseeing the hatchery salmon program.

E. Location

This project will take place in PWS at the Armin F Koernig Hatchery on Evans Island, and the Wally Noerenberg Hatchery on Esther Island.

PROJECT IMPLEMENTATION

PWSAC will implement the project in conjunction with ADFG as the lead agency.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is part of the **SEA** program research initiated in 1994 and proposed for continuation in 1995 as a powerful test of the influence of ocean-entry timing and of fry size at ocean entry on losses to predators.

FY 95 BUDGET ($K)

Personnel	0.0
Travel	0.0
Contractual	43.8
Commodities	0.0
Equipment	0.0
Subtotal	43.8
Gen. Admin.	3.5
Total	47.3

Herring Predation by Humpback Whales in Prince William Sound

Project Number:	95320V
Restoration Category:	Research
Proposed By:	North Gulf Oceanic Society
Lead Trustee Agency:	ADFG
Cost FY 95:	$279,800
Cost FY 96:	$0
Total Cost:	$279,800
Duration:	1 year
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring

INTRODUCTION

In Southeastern Alaska and Prince William Sound, herring (*Clupea harengus pallasi*) and krill (*Euphausia pacifica, Thysanoessa spinifera, T. raschii*) are considered important prey items of humpback whales. Photo-identification and enumeration studies of humpback whales in Prince William Sound have been conducted every year from 1980 to 1994. Observations during these studies suggest herring as a food item of humpback whales. In Sitka Sound (southeastern Alaska) herring are an important fall/winter food item for humpback whales. Humpback whales were closely associated with the herring schools in western Prince William Sound during acoustic surveys completed by the Alaska Department of Fish and Game and Prince William Sound Science Center in 1993. There is concern that humpback whale predation may limit the recovery of the diminished herring biomass in the Sound. Additionally, the reduced herring resource may restrict the feeding opportunities for the whales and eventually reduce the population of whales that feed in Prince William Sound. This project will test the hypothesis that herring are a seasonally important food item of humpback whales in Prince William Sound and that the whales have a significant impact on the recovery of the EVOS damaged herring resource.

NEED FOR THE PROJECT

Because of the recent precipitous decline of the herring population in Prince William Sound, it is important to understand which factors are limiting the herring population and may effect or delay its recovery. Predation by humpback whales may be one of these factors.

Adult humpback whales may weigh as much as 43.9 metric tons, although, their average weight may be somewhat less. It has been estimated by Sargent that the feeding rate for adult rorquals is about 4% of body weight per day. Von Ziegesar et al. identified 59 humpback whales in 1989 and 65 whales in 1990 in Prince William Sound. If approximately half these whales (30 individuals) were to feed exclusively on herring during the September/October period (60 days), it is conceivable that they would consume as much as 3000 metric tons of herring. Aerial surveys in April of 1994 suggest that the current herring biomass in the Sound is in the range of 20,000 metric tons. Humpback whales could consume a substantial proportion of this biomass. During the October 1993 herring hydroacoustic surveys, humpback whales were repeatedly observed in the same area as both large aggregations and scattered schools of herring. On one instance, an estimated 15 or more whales were associated with a very large herring school between Green Island and Applegate Rocks. Whales were often associated with scattered schools of herring in the waters between Seal Rocks and Bay of Isles. Most of the herring were observed at depths of 10 to 60 meters. These shallow schools are well within the diving range of humpback whales, estimated to be 0-120 meters by Dolphin (1987). If herring are a critical prey item for the endangered humpback whales in the Sound, the diminished herring population may reduce the population of whales. In turn, the currently developing whale watching segment of the tourist industry will be negatively impacted.

PROJECT DESIGN

A. Objectives

Investigators will examine the impact of humpback whales on EVOS damaged herring stocks in Prince William Sound. In addition, they will assess the importance of herring as a food of Prince William Sound humpback whales. The seasonal importance of herring in the whales diet will be examined using acoustic and photographic techniques and whales enumerated using photo-identification techniques. Estimates of herring consumption by whales will be developed and a model of whale predation will be constructed.

B. Methods

Humpback whales will be located by search of historically important feeding areas or by using reports from other vessels. Whales feeding in the areas of operation of the SEA herring biomass surveys and other SEA hydroacoustic surveys will receive primary attention. Once located, feeding whales will be tracked on sonar as they descend to feed. Layers or patches of feed will also be visible on the sonar scan. The whales movement through these patches can be

observed and charted with sonar. This technique was established by Dolphin and has been used subsequently by J.Straley in southeast Alaska. Specially outfitted still cameras with video monitor will be lowered into the feed patches being used by the whales. Photographs of prey will be taken to determine species composition and density. Detailed hydroacoustic assessment of identified humpback whale prey biomass will be made by other SEA hydroacoustic survey vessels when possible. Concurrently, a skiff working from the survey vessel will conduct photo-identification operations in the area, enumerating individual humpback whales. Numbers of whales using specific feeding locations will be determined as well as estimates of numbers using the entire region. Estimates of prey consumption will be constructed based on metabolic requirements of the whales, prey composition, and the numbers of whales in the feeding population.

C. Schedule

Primary survey effort (25 days) will occur in October 1995 in conjunction with the proposed SEA herring biomass surveys. Additional surveys will be conducted in June/July 1995 (10 days) and September 1995 (10 days) to provide a more complete picture of whale seasonal feeding habits. These surveys will be coordinated with other SEA hydroacoustic assessment surveys. A summary of field activities will be provided in early November. Data analysis will occur in November and December 1995 and January 1996. Draft annual report will be submitted in March 1996.

D. Technical Support

Computer modeling and biometric support will be provided by project personnel at the Prince William Sound Science Center.

E. Project Location

Work will occur in southwestern Prince William Sound. Location of fieldwork will be dependent on humpback whale distribution. Distribution varies from year to year. However, in late fall (October), distribution is expected to coincide with the location of herring in the Montague Strait and waters east of Knight Island. Earlier surveys (June/July and September) will be located in Montague Strait or Lower Knight Island Passage.

PROJECT IMPLEMENTATION

This study will be conducted by the North Gulf Oceanic Society in conjunction with the Prince William Sound Science Center, University of Alaska, and Alaska Department of Fish and Game as a core project in the SEA program. NGOS personnel have over 14 years of experience studying humpback whales using photo-identification techniques. NGOS maintains an annually updated photographic catalogue of individual humpback whales. NGOS has conducted

preliminary hydroacoustic studies of humpback whale prey in cooperation with the National Marine Fisheries Service.

COORDINATION OF INTEGRATED RESEARCH EFFORT

The success of this project will rely on coordination with other herring oriented projects in the SEA package. Fieldwork will be closely coordinated with 320H The role of Zooplankton in the Prince William Sound Ecosystem and 320N Nearshore fish/ Acoustics project.

FY 95 BUDGET ($K)

Personnel	7.2
Travel	0.0
Contractual	254.0
Commodities	0.0
Equipment	0.0
Subtotal	261.2
Gen. Admin.	18.7
Total	279.8

Waste Oil Disposal Facilities (Carry-forward of 1994 Funds)

Project Number:	95417
Restoration Category:	General Restoration (carry-forward)
Proposed By:	ADEC
Cost FY 95:	This project was funded for $232,000 in FY 1994; it is not yet complete. Authorization to spend FY 1994 funds ends on October 31, 1994. The Council is asked to reauthorize use of unspent funds to complete the project.
Cost FY 96:	$399,500
Total Cost:	Unknown
Duration:	1 year (additional funds may be requested in 1996 depending upon the results in 1995)
Geographic Area:	Oil spill area
Injured Resource/Service:	Multiple resources

INTRODUCTION

Project 94417, Waste Oil Disposal Facilities, was approved by the Trustee Council on January 31, 1994 for $232,200. As of June 1994, this project was awaiting conclusion of NEPA compliance activities. The project is expected to begin during late June or early July 1994, and it will not be completed before October 31, 1994. This project description requests that the Trustee Council allow funds not spent in fiscal year 1994 be used to complete the project in fiscal year 1995. Total expenditures for the two fiscal years will not exceed the $232,200 previously authorized by the Council.

NEED FOR THE PROJECT

(From the 1994 Project Description)
Vessels in Prince William Sound and the Gulf of Alaska, especially in the zone affected by the *Exxon Valdez* oil spill, generate large quantities of used motor oil and other lubricants. In spite of regulations and enforcement actions to the contrary, a substantial (but unknown) amount of this waste oil finds its way into the marine environment. During the recovery phase of the spill it is desirable to eliminate additional sources of hydrocarbon contamination to the marine environment. The ports of Whittler, Homer, Seaward, and Valdez all support increasingly large

fleets of pleasure and recreational craft in addition to the resident and transient commercial fishing fleets. Cordova and Kodiak are seasonally among the busiest fishing ports on the West Coast. Villages such as Tatitlek, Chenega Bay, Port Graham, English Bay, and the Kodiak Island villages are home port for small-scale commercial fishing and subsistence-use vessels.

Proper disposal of used oil has long been viewed as a problem throughout the area. Handling, storage, and transportation of used oil has carried considerable cost and potential liability, especially under now-outdated federal regulations that routinely placed almost all waste oil under hazardous waste handling regulations. While some communities have waste oil collection facilities, others do not. Even at these few sites with collection facilities what to do with the waste oil once it is collected remains a major problem.

Nationwide, regulatory and financial issues have discouraged people from properly disposing of waste oil; more often than not, waste oil was illegally dumped in landfills, sewer systems, or other open sites. In 1992, the U.S. Environmental Protection Agency estimated that 170 million of the 190 million gallons of waste oil generated in the nation found its way into the environment due to improper disposal; this represents approximately 16 times the amount of oil spilled by the *Exxon Valdez*. On August 12, 1992, USEPA changed its classifications regarding waste oil recycling and disposal, eliminating many of the regulatory disincentives frustrating the development of good waste oil handling and disposal in the nation.

The change in federal rules offers the Trustee Council an opportunity to support a project that would reduce the amount of waste oil entering the marine environment in the area affected by the *Exxon Valdez* oil spill. Reducing or eliminating other sources of hydrocarbon contamination in the spill area is desirable as it will help resources injured by the spill recover quickly.

The entire restoration effort would be enhanced by the successful implementation of this project. By providing an environmentally acceptable method of waste oil disposal the continuing introduction of hydrocarbons into the marine environment would be reduced thus permitting natural recovery to continue as quickly as possible.

PROJECT DESIGN

A. Objectives

To reduce the incidental introduction of oil into the spill area ecosystem by providing alternative methods of disposal of waste oil products.

B. Methods

This project would create a waste oil recycling and/or disposal pilot program in a few communities that wish to participate. Depending on the success of the program this year, it will be proposed for expansion in future years. Communities could propose to use marine pollution control grants from the Trustee Council to purchase equipment for recycling and/or disposing

of waste oil depending on what method(s) the community felt most appropriate to the local conditions. Volume of waste oil, distance from recycling centers, the need or opportunity for re-use of oil, and the costs (in terms of both money and mechanical complexity) of continuing operation would be among the criteria used to evaluate proposals from the communities.

Communities wishing to participate in this program would submit proposals. An evaluation committee would review the applications for technical and regulatory feasibility. Awards would be made and the communities would begin installation.

These facilities would be wholly owned by the local organization or government that applied for the funding. Maintenance and operation would be paid by the communities through user fees, assessments, or cost-recovery plans (e.g., reuse of waste oil for heating municipal facilities) depending on the wishes and resources of the communities. The facilities would be monitored, information collected, and a report prepared detailing the success or failure of the project.

C. Schedule

August - July 1994	Meet with communities to get assistance in developing proposal packets and scoring criteria
September 1994	Send out proposal packets to communities and advertise
Nov - Feb 1995	Receive submittals, convene proposal evaluation committee, review and rank proposals, notify recipients, negotiate grant/contract awards
March - May 1995	Communities proceed with equipment purchases and development
Jan. - Feb. 1995	Project manager visit communities
June 1995	Receive first project reports from communities
Sept. 1995	Receive second operations report from communities

D. Technical Support

A small amount of computer support would be required in collecting the data reported by the grantees and storing it in a data base. The information would be utilized in preparing a report for the Trustees as to the relative success of the project.

E. Location

Communities within the spill affected area.

PROJECT IMPLEMENTATION

This project was approved for Fiscal Year 1994 and is being implemented by DEC.

COORDINATION OF INTEGRATED RESEARCH EFFORT

This project is a different type from other projects in the spill in terms of logistics, and community contacts. Thus, no specific coordination is needed.

FY 95 BUDGET ($K) (carry-forward of FY 94 funds)

Personnel	49.6
Travel	19.9
Contractual	142.9
Commodities	2.4
Equipment	0.0
Subtotal	214.8
Gen. Admin.	17.4
Total	232.2

Restoration Plan Environmental Impact Statement/Record of Decision

Project Number:	95422-CLO
Restoration Category:	Administration, Public Information and Science Management (closeout)
Proposed By:	USFS
Cooperating Agencies:	All Trustee Agencies
Cost FY 95:	$20,000
Cost FY 96:	$0
Total Cost:	$20,000
Duration:	1 year
Geographic Area:	Prince William Sound, Gulf of Alaska, Kenai Peninsula, Kodiak Archipelago, Alaska Peninsula
Injured Resource/Service:	Multiple resources

INTRODUCTION

This project will analyze the environmental effects of implementing the Draft Restoration Plan developed over the past two years, develop alternative Restoration Plans, and disclose the effects in an Environmental Impact Statement.

NEED FOR THE PROJECT

Federal law requires an Environmental Impact Statement for major federal actions significantly affecting the quality of the human environment. The Trustee Council members have agreed that the Restoration Plan constitutes a major federal action, and, subseqently, an Environmental Impact Statement is required before a final restoration plan is adopted.

PROJECT DESIGN

On October 8, 1991, a federal court approved a settlement between the State and Federal governments and Exxon Corp. under which Exxon agreed to pay $1 billion in criminal restitution and civil damages to the governments. The State and Federal Trustees will receive

$900 million in civil damages from Exxon over 10 year period. These funds are to be used to restore, to their pre-spill conditions, the natural resources and the services they provide that were injured by the *Exxon Valdez* oil spill. This includes the restoration of any natural resource injured, lost or destroyed and the services provided by that resource or a natural resource which replaces or substitutes for the injured, lost or destroyed resource and affected services. Restoration includes all phases of injury assessment, restoration, replacement, and enhancement of natural resources, and acquisition of equivalent resources and services.

All decisions concerning restoration and uses of restoration funds are determined by six natural resources Trustees, three Federal and three State. The three Federal Trustees are: the Administrator for the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, the Secretary of the of Agriculture and the Secretary of the Interior. The three State Trustees are: The Commissioners of Fish and Game and Environmental Conservation, and the Attorney General. A Trustee Council, located in Alaska, which is made up of designees of the Federal Trustees and the three State Trustees, is responsible for all decisions relating to the assessment of injuries, uses of the restoration funds, and all restoration activities including the preparation of a Restoration Plan.

On April 10, 1992 (57 FR 12473-12475) the Forest Service published a Notice of Intent to prepare an EIS on the Restoration Plan. Since then, the Trustee Council has developed a draft Restoration Plan which has become the proposed action for the analysis to be conducted in the EIS. The proposed action (Draft Restoration Plan) consists of nine policy statements, a discussion of categories of restoration actions and broad objectives for injured resources. The policies for identifying and conducting restoration actions are:

1. The restoration program will take an ecosystem approach.

2. Restoration activities may be considered for any injured resource or service.Most restoration activities will occur within the spill area.

3. Restoration activities outside the spill area, but within Alaska, may be considered, however, when the most effective restoration actions for an injured migratory population are in a part of its range outside the spill area or when the information acquired from research and monitoring activities outside the spill area will be important for restoration or understanding injuries within the spill area.

4. Restoration activities will emphasize resources and services that have not recovered. Resources and services will be enhanced, as appropriate, to promote restoration. Restoration projects should not adversely affect the ecosystem.

5. Projects designed to restore or enhance an injured service must have a sufficient relationship to an injured resource, must benefit the same user group that was injured, and should be compatible with the character and public uses of the area.

6. Competitive proposals for restoration projects will be encouraged.

7. Restoration projects will be subject to independent scientific review before Trustee Council approval.

8. Meaningful public participation in restoration decisions will be actively solicited.

9. Government agencies will be funded only for restoration work that they do not normally conduct.

Four types of restoration actions are identified and discussed in the Draft Restoration Plan: general restoration, habitat protection and acquisition, monitoring and research, and public information and administration. Alternatives to the proposed action will place different emphases on each of these categories of restoration actions, while satisfying the policies and objectives for injured resources described in the Draft Restoration Plan.

General Restoration consists of activities that fall within manipulation of the environment and management of human use for reduction of marine pollution. Decisions about conducting general restoration projects would look at the following factors: extent of natural recover, the value of an injured resource to the ecosystem and to the public, the duration of benefits, technical feasibility of the project, likelihood of success, the relationship of costs to expected benefits, potential for harmful side effects, benefits to more than one resource, effects on health and human safety, consistency with applicable laws and policies, and duplication with other actions.

Habitat Protection and Acquisition is a category that includes the purchase of private land or interests in land such as conservation easements, mineral rights, or timber rights. It also includes recommendations for changing public agency management practices. Specific policies that relate to habitat protection and acquisition are proposed. These policies deal with the ranking potential lands to determine potential benefits, the need for a willing seller, fair market valuation, post acquisition management of the acquired lands, and the involvment of the public in the prioritization process.

Monitoring and Research consists of recovery monitoring, restoration monitoring, and ecological monitoring and research. Specific policies governing the selectiion and performance of monitoring activities are discussed in the Draft Restoration Plan.

Public Information and Administration consists of all necessary administrative actions that are not attributable to a particular project. The Draft Restoration Plan goal is to limit administrative costs to an average of no more than 5% of overall restoration expenditures for the remainder of the settlement period.

General restoration objectives have been developed for resources that have been categorized as recovering, not recovering, recovery unknown, archaeological resources, wilderness, and services. These broad objectives will guide in the development of annual work plans.

Using an interdisciplinary approach, the important issues that arose from the proposed

Restoration Plan were analyzed and alternative restoration plans developed. These alternatives were analyzed and a draft Environmental Impact Statement was written and made available to the public and Trustee Council. The public and agencies commented on the Draft Environmental Impact Statement. After comments are analyzed and the draft statement revised, a Final Environmental Impact Statement will be issued. The Trustee Council will then be able to adopt a Final Restoration Plan. A Record of Decision will be prepared, signed, and distrubuted.

The Final Restoration Plan EIS will address all resources and services addressed in the Final Restoration Plan. This includes bald eagles, black oystercatchers, killer whales, sockeye salmon, common murres, harbor seals, harlequin ducks, marbled murrelets, Pacific herring, pigeon guillemots, pink salmon, sea otters, intertidal ecosystem, subtidal ecosystem, clams, cutthroat trout, Dolly Varden, river otter, rockfish, archaeological resources, and designated wilderness areas. Services addressed will include subsistence, commercial fishing, and recreation and tourism.

PROJECT DESIGN

A. Objectives

The FY94 objective of this project was to identify relevant issues from implementing the proposed Draft Restoration Plan, analyze the environmental and social consequences of implementing the Draft Restoration Plan and alternative Restoration Plans, and display the information in an Environmental Impact Statement. In 1995, the Record of Decision will be published and distributed, and the project, subsequently, will be completed.

B. Methods

An interdisciplinary team of State and Federal resource specialists will review available resource information, analyze the proposed action and alternatives, and write a Draft Environmental Impact Statement.

C. Schedule

A Draft Environmental Impact Statement was released for public comment in June 1994. The Final Environmental Impact Statement will be completed by September 30, 1994. The Record of Decision will be prepared in October 1994.

D. Technical Support

Federal and State agency personnel will provide technical expertise to assure compliance with National Environmental Policy Act requirements. Personnel will also be available to review resource reports and specific sections of the Draft and Final EIS to assure accuracy.

E. Location

All of the analysis and writing will be conducted in Anchorage, Alaska.

PROJECT IMPLEMENTATION

The project team leader will be responsible for coordinating the work of all team members and assuring work is completed on time. Agency specialists will review draft products before the Draft EIS is released to assure the document is accurate and complete.

COORDINATION OF INTEGRATED RESEARCH EFFORT

Not applicable.

FY 95 BUDGET ($K)

Personnel	14.8
Travel	0.0
Contractual	2.8
Commodities	0.0
Equipment	0.0
Subtotal	17.6
Gen. Admin.	2.4
Total	20.0

Subsistence Restoration Planning and Implementation

Project Number:	95428-CLO
Restoration Category:	General Restoration (closeout)
Proposed By:	ADFG
Cooperating Agencies:	DOI, USFS
Cost FY 95:	$100,000 (includes $98,000 for data analysis and report writing of FY 94 work)
Cost FY 96:	$47,100 (report writing only)
Total Cost:	$147,100
Duration:	1 year
Geographic Area:	Prince William Sound, lower Kenai Peninsula, Kodiak Island, Alaska Peninsula
Injured Resource/Service:	Subsistence

INTRODUCTION

In FY 1994, the Trustee Council funded a subsistence planning and implementation project to develop a coordinated approach to subsistence restoration and to work with subsistence users to design restoration projects. The purpose of this project in FY 95 is to continue to address the need to restore subsistence uses by cooperatively developing subsistence restoration project proposals for the Trustee Council Work Plan for FY 96. An important goal is to insure the participation of subsistence users in these and other FY 96 planning efforts. Such projects could propose to directly restore resources used for subsistence, provide alternative natural resources, or restore access or people's use of the resource. Guidelines for project content will be developed, project ideas will be solicited and prioritized through a public process, project proposals will be evaluated, and a set of project proposals will be presented to the Trustee Council for funding consideration.

Project ideas developed through this planning process which do not become part of the FY 96 Work Plan may be eligible for funding through grants from a $5 million appropriation of Exxon Valdez criminal settlement funds by the Alaska Legislature. The legislature authorized the Department of Community and Regional Affairs to award grants to unincorporated rural communities in the oil spill area in order to restore, replace, or enhance subsistence resources

or services damaged or lost as a result of the spill (Section 11, Chapter 79, SLA 1993). The legislation requires that selection of grant recipients shall be made after consultation with the state members of the Trustee Council.

NEED FOR THE PROJECT

The purpose of the project is to collaboratively develop and evaluate proposals to restore or enhance injured subsistence resources and lost or diminished subsistence uses. Subsistence uses of fish and wildlife are a vital service that was impaired as a result of the Exxon Valdez oil spill. After the spill, harvest levels declined, sharing of resources was reduced, and the transmission of skills and knowledge about natural resources was disrupted. While harvest levels and participation in subsistence activities have rebounded somewhat since the first two post-spill years, effects of the spill remain. These include concerns about the long term health effects of using resources from the spill area, a loss of confidence in individuals' abilities to judge if resources are safe to eat, scarcity of certain injured subsistence resources (natural resources such as harbor seals, marine invertebrates, and waterfowl) in traditional harvest areas, increased costs associated with subsistence harvests, and reduced opportunities for young people to learn the subsistence way of life. Subsistence uses can be restored only if the natural resource base is healthy and if subsistence users are directly involved in restoring injured natural resources. Projects designed during this process will focus on these goals. During the limited time available in FY 94 to begin this project (funding was only available beginning in June 1994), planning efforts were focused on Prince William Sound and lower Cook Inlet communities. Much of the planning team's time was devoted to developing background information for communities and organizing a comprehensive approach to the subsistence restoration process. In FY 95, therefore, efforts need to expand to involve the remaining spill area communities in the subsistence restoration planning process and to follow-up on project ideas identified during the first round of community meetings in 1994.

PROJECT DESIGN

A. Objectives

The project has three primary objectives for FY 95. The first objective is to implement a comprehensive approach to subsistence restoration begun in FY 94. The second objective is to meet with residents of the subsistence communities in the spill area to identify community needs and priorities related to injured subsistence resources and services. The third is to work with communities to develop proposals to restore reduced or lost subsistence resources and services.

B. Methods

Guidelines for appropriate topics for projects have been developed as part of a coordinated approach to subsistence restoration by the Alaska Department of Fish and Game (Division of Subsistence), the Alaska Department of Community and Regional Affairs (DCRA) (Division of Municipal and Regional Assistance), the U.S. Department of the Interior, and the U.S. Forest Service (the latter two agencies representing the federal Trustee Council members), with assistance from the Alaska Department of Law, Trustee Council staff, and representatives of spill-area communities. An outreach program in subsistence communities will be conducted to solicit ideas and priorities for restoration of subsistence resources and lost or reduced subsistence uses. A local community facilitator will be hired as a nonpermanent employee within the Division of Subsistence to assist with the planning and implementation of community meetings and workshops. Following the meetings, interested parties may develop projects as proposals for funding, for which project staff will provide assistance. After evaluation of the proposals, recommendations will be presented to the Trustee Council for review.

C. Schedule

October 1994. Community meetings to review FY 95 Work Plan; continue work on project ideas developed in FY 94 but not part of the FY 95 work plan, identify new project ideas for FY 96 work plan

November 1994 - March 1995. Continue working with communities and other organizations to develop project descriptions and designs; as necessary, monitor implementation of FY 95 subsistence restoration projects; complete report for FY 94.

March 1995. Conduct community meetings to review project proposals and develop priorities.

April 15 1995. Submit project descriptions for Trustee Council approval.

August 1995. Finalize FY 96 Work Plan; complete final report.

D. Technical Support

This project will not need technical support as described in the proposal guidelines.

E. Location

Prince William Sound, Cook Inlet, Kodiak Island Borough, and the Alaska Peninsula within the spill area

PROJECT IMPLEMENTATION

The ADFG Division of Subsistence maintains an ongoing program of data collection and report

preparation about the role of subsistence activities in Alaska, including the spill area communities. The division is currently involved in a joint project with the U.S. Minerals Management Service, which, among other things, is investigating social effects of the spill. The division is also actively engaged in research on subsistence harbor seal and sea lion harvests in coastal communities of southcentral and southwest Alaska, supported by the National Marine Fisheries Service. In addition, the division is the lead agency on two FY 94 oil spill restoration projects: Project 94279, Subsistence Foods Safety Testing; and Project 94244, Harbor Seal and Sea Otter Co-op Subsistence Harvest Assistance. The Division of Community and Regional Assistance (within DCRA) provides technical assistance services, including grants administration, to communities and has administered an emergency oil spill impact program in the spill area. The U.S. Department of the Interior and the U.S. Forest Service are responsible for management of subsistence activities on federal lands and are member agencies of the Trustee Council.

Relation to Other Damage Assessment/Restoration work: The FY 94 Restoration Plan includes two subsistence restoration projects: 94244 (Harbor Seal and Sea Otter Co-op Subsistence Harvest Assistance) and 94279 (Subsistence Food Safety Testing). Aspects of these projects may be continued as part of projects developed during the cooperative planning effort. Projects more appropriately supported through grants from the $5 million appropriation from the criminal settlement money may also be identified.

COORDINATION OF INTEGRATED RESEARCH EFFORT

As a planning project, a goal of this project will be to coordinate the subsistence restoration program with other research efforts.

FY 95 BUDGET ($K)

Personnel	70.2
Travel	16.1
Contractual	2.0
Commodities	1.0
Equipment	0.0
Subtotal	89.3
Gen. Admin.	10.7
Total	100.0

Exxon Valdez **Oil Spill Trustee Council**
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Attn: Comments on Draft FY 95 Work Plan

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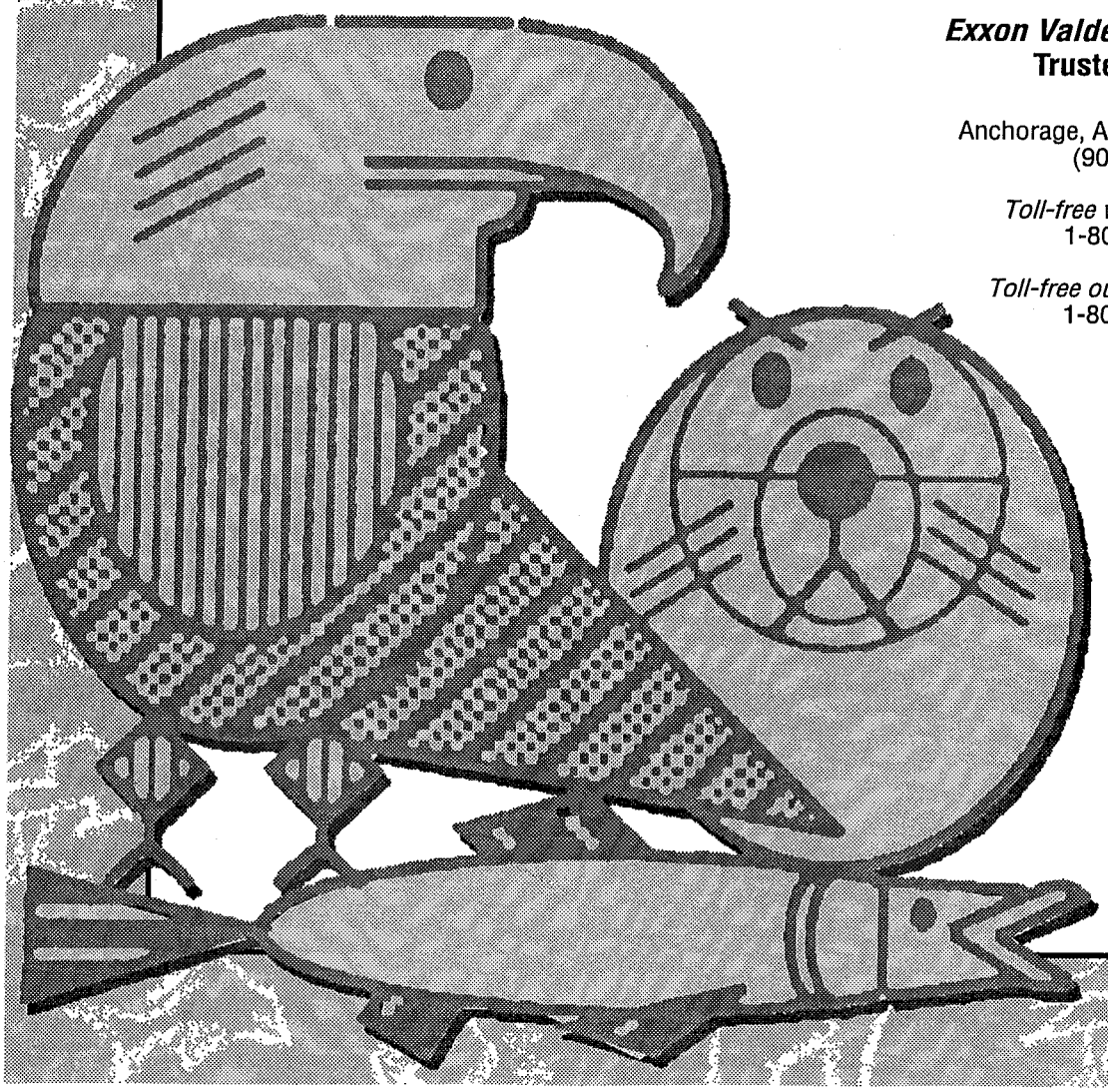
Supplement Volume III

Detailed Budgets



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August
1994

DRAFT FY95 WORK PLAN - SUPPLEMENT VOLUME III
DETAILED BUDGETS FOR PROJECT PROPOSALS

SEPTEMBER 1994

Exxon Valdez Trustee Council
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State of Alaska: Departments of Fish & Game, Law,
and Environmental Conservation
United States: National Oceanic and Atmospheric Administration,
Departments of Agriculture and Interior

Detailed Budgets for Project Proposals

Project#	*Project Title*	*Lead Agency*	*Project Type*
95001	Condition and Health of Harbor Seals	ADFG	Research
95007A	Archaeological Site Restoration - Index Site Monitoring	ADNR	Monitoring
95007B	Archaeological Site Restoration	USFS	General Restoration
95013	Killer Whale Monitoring in PWS	NOAA	Monitoring
95014	Predation by Killer Whales in PWS: Feeding Behavior and Distribution of Predators and Prey	NOAA	Research
95018	Partitioning of Primary Production Between Pelagic and Benthic Communities	ADFG	Research
95019	Distribution and Abundance of Forage Fish as Indicated by Puffin Diet Sampling	DOI	Research
95021	Seasonal Movement and Pelagic Habitat Use by Common Murres from the Barren Islands	DOI	Research
95022	Foraging Efficiencies at Temporary Food Patches	DOI	Research
95023	Food Web Relationships of Pelagic Species Exhibiting Long-term Decline	DOI	Research
95024	Enhancement of Wild Pink Salmon Stocks	ADFG	General Restoration
95025A	Factors Affecting Recovery of Sea Ducks and Their Prey	DOI	Research
95025B	Sea Otter Abundance and Distribution, Food Habits and Population Assessment	DOI	Research
95025C	Pigeon Guillemots and River Otters as Bioindicators of Nearshore Ecosystem Health	DOI	Research
95025D	Settlement Rates of Nearshore Invertebrates, Oceanic Processes and Population Recovery: Are They Linked?	DOI	Research
95025E	Algal Competition Limiting Recovery in the Intertidal	DOI	Research
95025F	Availability and Utilization of *Musculus spp.* as Food for Sea Ducks and Sea Otters	DOI	Research
95025G	Relation of Clam Population Structure to Recovery of Injured Nearshore Vertebrate Predators	DOI	Research
95025H	Effects of Predatory Invertebrates on Nearshore Clam Populations in PWS	DOI	Research
95026	Hydrocarbon Monitoring: Integration of Microbial and Chemical Sediment Data	ADEC	Monitoring
95027	Kodiak Shoreline Assessment: Monitoring Surface and Subsurface Oil	ADEC	Monitoring
95029	Population Survey of Bald Eagles in PWS	DOI	Monitoring
95030	Productivity Survey of Bald Eagles in PWS	DOI	Monitoring
95031	Reproductive Success as a Factor Affecting Recovery of Murrelets in PWS	DOI	Research
95033	Kittiwakes as Indicators of Forage Fish Availability	DOI	Research
95038	Symposium on Seabird Restoration	DOI	General Restoration
95039	Common Murre Productivity Monitoring	DOI	Monitoring
95041	Introduced Predator Removal from Islands - Follow-up Surveys	DOI	General Restoration
95043A	Cordova Cutthroat Trout Habitat	USFS	General Restoration
95043B	Carry-forward: Cutthroat and Dolly Varden Rehabilitation in Western PWS	USFS	General Restoration
95044	In Situ Formation and Ecotoxicity of Hydrocarbon Degradation Products Produced by Ultramicrobacteria	NOAA	Research

Note: Detailed budgets were not prepared for all proposed projects. This list does not include projects which did not have a detailed budget prepared at the time of printing. Summary budgets for all projects can be found in the *Draft Fiscal Year 1995 Work Plan: Supplement Volume I and Supplement Volume II*.

Detailed Budgets for Project Proposals

Project#	*Project Title*	*Lead Agency*	*Project Type*
95048	Historical Analysis of Sockeye Salmon Growth	ADFG	Monitoring
95051	Large-scale Coded Wire Tagging of PWS Herring	ADFG	General Restoration
95052	Community Involvement and Use of Traditional Knowledge	ADNR	General Restoration
95055	Prehistoric Ecological Baseline for PWS	USFS	Research
95057	Movement of Larval and Juvenile Fishes within PWS	NOAA	Research
95058	Restoration Assistance to Private Landowners	ADFG	Habitat Protection
95060	Spruce Bark Beetle Infestation Impacts on Injured Fish and Wildlife Species of the Exxon Valdez Oil Spill	ADFG	Habitat Protection
95062	River Otter Recovery Monitoring	ADFG	Monitoring
95064	Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in PWS	ADFG	Research
95065	PWSAC Pink Salmon Fry Mortality	ADFG	Research
95069	Restoration of Salmon Stocks of Special Importance to Native Cultures	ADFG	General Restoration
95074	Herring Reproductive Impairment	NOAA	Research
95075	Population Structure of Blue Mussels in Relation to Levels of Oiling and Densities of Vertebrate Predators	NOAA	Research
95076	Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon	NOAA	Research
95086A	Coastal Habitat Intertidal Monitoring and Experimental Design Verification	ADFG	Monitoring
95086B	Population Dynamics of Eelgrass and Associated Fauna	ADFG	Research
95086C	Herring Bay Monitoring and Restoration Studies	ADFG	Research
95087	Relation of Sea Urchin Population Structure to Recovery of Injured Nearshore Vertebrate Predators	ADFG	Research
95089	Information Management System	ALL	Administration & Public Information
95090	Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska	NOAA	Monitoring
95092	Recovery Monitoring of PWS Killer Whales	NOAA	Monitoring
95100	Administration, Science Management and Public Information	ALL	Administration & Public Information
95102-CLO	Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound	DOI	Research
95105	Kenai River Ecosystem Restoration Pilot Enclosure Study	ADFG	General Restoration
95106	Subtidal Monitoring: Eelgrass Communities	ADFG	Monitoring
95107	Subtidal Site Verification	ADFG	Monitoring
95110-CLO	Closeout: Habitat Protection and Acquisition	ADNR	Habitat Protection
95111	Sustainable Rockfish Yield	ADFG	General Restoration
95112	Rockfish Restoration Objective	ADFG	General Restoration
95114	Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers	ADFG	Research
95115	Sound Waste Management Plan	ADEC	General Restoration

Note: Detailed budgets were not prepared for all proposed projects. This list does not include projects which did not have a detailed budget prepared at the time of printing. Summary budgets for all projects can be found in the *Draft Fiscal Year 1995 Work Plan: Supplement Volume I and Supplement Volume II.*

Detailed Budgets for Project Proposals

Project#	*Project Title*	*Lead Agency*	*Project Type*
95116	Restoration of Intertidal Oiled Mussel Beds by Nondestructive Manipulation/Flushing with PES-51	ADEC	General Restoration
95117-BAA	Harbor Seals and EVOS: Blubber and Lipids as Indices of Food Limitation	NOAA	Research
95118-BAA	Diet Composition, Reproductive Energetics and Productivity of Seabirds Damaged by the Exxon Valdez Oil Spill	NOAA	Research
95120-BAA	Proximate Composition and Energetic Content of Selected Forage Fish Species in PWS	NOAA	Research
95121	Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish Species in PWS	NOAA	Research
95122	Mapping Potential Nesting Habitat of Marbled Murrelets in PWS Using Geographic Databases	USFS	Habitat Protection
95126	Habitat Protection and Acquisition Support	ADNR	Habitat Protection
95131	Clam Restoration (Nanwalek, Port Graham, Tatitlek)	ADFG	General Restoration
95132	Port Graham and Nanwalek Subsistence Baseline	ADFG	General Restoration
95133	English Bay River Sockeye Salmon Subsistence Project	ADFG	General Restoration
95137	Prince William Sound Salmon Stock Identification and Monitoring Studies	ADFG	General Restoration
95138	Elders/Youth Conference	ADFG	General Restoration
95139-A1	Salmon Instream Habitat and Stock Restoration - Little Waterfall Creek Bypass	ADFG	General Restoration
95139-A2	Salmon Instream Habitat and Stock Restoration - Port Dick Channel	ADFG	General Restoration
95139B	Closeout: Otter Creek/Shrode Creek Instream Restoration	USFS	General Restoration
95139-C1	Montague Island Riparian Habitat Restoration	USFS	Habitat Protection
95139-C2	Salmon Instream Habitat and Stock Restoration- Lowe River (6.5 mi Richardson Hwy)	USFS	Habitat Protection
95139D	Salmon Instream Habitat and Stock Restoration--Pink Creek and Horse Marine Barrier Bypass Development	ADFG	General Restoration
95141	Afognak Island State Park Interim Support	ADNR	General Restoration
95159	Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in PWS	DOI	Monitoring
95163	Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species	NOAA	Research
95165	Carry-forward: PWS Herring Genetic Stock Identification	ADFG	General Restoration
95166	Herring Natal Habitats	ADFG	Monitoring
95173	Factors Affecting Recovery of PWS Pigeon Guillemot Populations	DOI	Research
95191A	Investigating and Monitoring Oil Related Egg and Alevin Mortalities	ADFG	Research
95191B	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)	NOAA	Research
95199-CLO	Institute of Marine Science - Seward Improvements EIS	ADFG	Research
95200	Public Access	USFS	Habitat Protection
95244	Seal and Sea Otter Cooperative Subsistence Harvest Assistance	ADFG	General Restoration

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Detailed Budgets for Project Proposals

Project#	*Project Title*	*Lead Agency*	*Project Type*
95048	Historical Analysis of Sockeye Salmon Growth	ADFG	Monitoring
95051	Large-scale Coded Wire Tagging of PWS Herring	ADFG	General Restoration
95052	Community Involvement and Use of Traditional Knowledge	ADNR	General Restoration
95055	Prehistoric Ecological Baseline for PWS	USFS	Research
95057	Movement of Larval and Juvenile Fishes within PWS	NOAA	Research
95058	Restoration Assistance to Private Landowners	ADFG	Habitat Protection
95060	Spruce Bark Beetle Infestation Impacts on Injured Fish and Wildlife Species of the Exxon Valdez Oil Spill	ADFG	Habitat Protection
95062	River Otter Recovery Monitoring	ADFG	Monitoring
95064	Monitoring, Habitat Use, and Trophic Interactions of Harbor Seals in PWS	ADFG	Research
95065	PWSAC Pink Salmon Fry Mortality	ADFG	Research
95069	Restoration of Salmon Stocks of Special Importance to Native Cultures	ADFG	General Restoration
95074	Herring Reproductive Impairment	NOAA	Research
95075	Population Structure of Blue Mussels in Relation to Levels of Oiling and Densities of Vertebrate Predators	NOAA	Research
95076	Effects of Oiled Incubation Substrate on Survival and Straying of Wild Pink Salmon	NOAA	Research
95086A	Coastal Habitat Intertidal Monitoring and Experimental Design Verification	ADFG	Monitoring
95086B	Population Dynamics of Eelgrass and Associated Fauna	ADFG	Research
95086C	Herring Bay Monitoring and Restoration Studies	ADFG	Research
95087	Relation of Sea Urchin Population Structure to Recovery of Injured Nearshore Vertebrate Predators	ADFG	Research
95089	Information Management System	ALL	Administration & Public Information
95090	Mussel Bed Restoration and Monitoring in PWS and Gulf of Alaska	NOAA	Monitoring
95092	Recovery Monitoring of PWS Killer Whales	NOAA	Monitoring
95100	Administration, Science Management and Public Information	ALL	Administration & Public Information
95102-CLO	Closeout: Murrelet Prey and Foraging Habitat in Prince William Sound	DOI	Research
95105	Kenai River Ecosystem Restoration Pilot Enclosure Study	ADFG	General Restoration
95106	Subtidal Monitoring: Eelgrass Communities	ADFG	Monitoring
95107	Subtidal Site Verification	ADFG	Monitoring
95110-CLO	Closeout: Habitat Protection and Acquisition	ADNR	Habitat Protection
95111	Sustainable Rockfish Yield	ADFG	General Restoration
95112	Rockfish Restoration Objective	ADFG	General Restoration
95114	Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers	ADFG	Research
95115	Sound Waste Management Plan	ADEC	General Restoration

Note: Detailed budgets were not prepared for all proposed projects. This list does not include projects which did not have a detailed budget prepared at the time of printing. Summary budgets for all projects can be found in the *Draft Fiscal Year 1995 Work Plan: Supplement Volume I and Supplement Volume II.*

Detailed Budgets for Project Proposals

Project#	*Project Title*	*Lead Agency*	*Project Type*
95116	Restoration of Intertidal Oiled Mussel Beds by Nondestructive Manipulation/Flushing with PES-51	ADEC	General Restoration
95117-BAA	Harbor Seals and EVOS: Blubber and Lipids as Indices of Food Limitation	NOAA	Research
95118-BAA	Diet Composition, Reproductive Energetics and Productivity of Seabirds Damaged by the Exxon Valdez Oil Spill	NOAA	Research
95120-BAA	Proximate Composition and Energetic Content of Selected Forage Fish Species in PWS	NOAA	Research
95121	Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish Species in PWS	NOAA	Research
95122	Mapping Potential Nesting Habitat of Marbled Murrelets in PWS Using Geographic Databases	USFS	Habitat Protection
95126	Habitat Protection and Acquisition Support	ADNR	Habitat Protection
95131	Clam Restoration (Nanwalek, Port Graham, Tatitlek)	ADFG	General Restoration
95132	Port Graham and Nanwalek Subsistence Baseline	ADFG	General Restoration
95133	English Bay River Sockeye Salmon Subsistence Project	ADFG	General Restoration
95137	Prince William Sound Salmon Stock Identification and Monitoring Studies	ADFG	General Restoration
95138	Elders/Youth Conference	ADFG	General Restoration
95139-A1	Salmon Instream Habitat and Stock Restoration - Little Waterfall Creek Bypass	ADFG	General Restoration
95139-A2	Salmon Instream Habitat and Stock Restoration - Port Dick Channel	ADFG	General Restoration
95139B	Closeout: Otter Creek/Shrode Creek Instream Restoration	USFS	General Restoration
95139-C1	Montague Island Riparian Habitat Restoration	USFS	Habitat Protection
95139-C2	Salmon Instream Habitat and Stock Restoration- Lowe River (6.5 mi Richardson Hwy)	USFS	Habitat Protection
95139D	Salmon Instream Habitat and Stock Restoration--Pink Creek and Horse Marine Barrier Bypass Development	ADFG	General Restoration
95141	Afognak Island State Park Interim Support	ADNR	General Restoration
95159	Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in PWS	DOI	Monitoring
95163	Abundance and Distribution of Forage Fish and their Influence on Recovery of Injured Species	NOAA	Research
95165	Carry-forward: PWS Herring Genetic Stock Identification	ADFG	General Restoration
95166	Herring Natal Habitats	ADFG	Monitoring
95173	Factors Affecting Recovery of PWS Pigeon Guillemot Populations	DOI	Research
95191A	Investigating and Monitoring Oil Related Egg and Alevin Mortalities	ADFG	Research
95191B	Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oiled Gravel (Laboratory Study)	NOAA	Research
95199-CLO	Institute of Marine Science - Seward Improvements EIS	ADFG	Research
95200	Public Access	USFS	Habitat Protection
95244	Seal and Sea Otter Cooperative Subsistence Harvest Assistance	ADFG	General Restoration

Note: Detailed budgets were not prepared for all proposed projects. This list does not include projects which did not have a detailed budget prepared at the time of printing. Summary budgets for all projects can be found in the *Draft Fiscal Year 1995 Work Plan: Supplement Volume I and Supplement Volume II*.

Detailed Budgets for Project Proposals

Project#	*Project Title*	*Lead Agency*	*Project Type*
95255	Kenai River Sockeye Restoration	ADFG	General Restoration
95258	Sockeye Salmon Overescapement	ADFG	Monitoring
95259	Restoration of Coghill Lake Sockeye	ADFG	General Restoration
95266	Shoreline Assessment and Oil Removal	ADEC	General Restoration
95272	Chenega Chinook Release Program	ADFG	General Restoration
95279	Subsistence Restoration Project	ADFG	General Restoration
95285-CLO	Closeout: Subtidal Sediment Recovery Monitoring	NOAA	Monitoring
95290	Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the Exxon Valdez Oil Spill	NOAA	Monitoring
95320A	Salmon Growth and Mortality	ADFG	Research
95320B	PWS Pink Salmon Stock Identification and Monitoring (CWT)	ADFG	General Restoration
95320C	Otolith Thermal Mass Marking of Hatchery Reared Pink Salmon in PWS	ADFG	General Restoration
95320D	PWS Pink Salmon Genetics	ADFG	General Restoration
95320E	Juvenile Salmon and Herring Integration	ADFG	Research
95320G	Phytoplankton and Nutrients	ADFG	Research
95320H	Role of Zooplankton in the PWS Ecosystem	ADFG	Research
95320I(1)	Isotope Tracers - Food Web Dependencies in PWS Using Stable Isotopes (Marine Mammals and Birds)	ADFG	Research
95320I(2)	Isotope Tracers - Food Webs of Fish	ADFG	Research
95320J	Information Systems and Model Development	ADFG	Research
95320K	PWSAC: Experimental Fry Release	ADFG	Research
95320M	Observational Physical Oceanography in PWS and the Gulf of Alaska	ADFG	Research
95320N	Nearshore Fish	ADFG	Research
95320Q	Avian Predation on Herring Spawn	USFS	Research
95320S	Disease Impacts on PWS Herring Populations (competitive solicitation under State of Alaska two-step, RFQ-RFP process)	ADFG	Research
95320T	Juvenile Herring Growth and Habitat Partitioning	ADFG	Research
95320U	Somatic and Spawning Energetics of Herring and Pollock	ADFG	Research
95320Y	Variation in Local Predation Rates on Hatchery-Released Fry	ADFG	Research
95417	Carry-forward: Waste Oil Disposal Facilities	ADEC	General Restoration
95422-CLO	Closeout: Restoration Plan EIS/Record of Decision	USFS	Administration & Public Information
95427	Harlequin Duck Recovery Monitoring	ADFG	Monitoring
95428-CLO	Closeout: Subsistence Planning Project	ADFG	General Restoration
95505B	Data Analysis for Stream Habitat	USFS	Habitat Protection

Note: Detailed budgets were not prepared for all proposed projects. This list does not include projects which did not have a detailed budget prepared at the time of printing. Summary budgets for all projects can be found in the *Draft Fiscal Year 1995 Work Plan: Supplement Volume I and Supplement Volume II*.

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

Project Description: Recovery of Harbor Seals from EVOS: Condition and Health Status- This project collaborates with the inter-disciplinary and integrative marine mammals ecosystems program submission to EVOS. Outlined under the broad program direction, the goals of the combined collaborative projects are to investigate ecosystem wide questions addressing the recovery of marine mammal injured species, specifically, harbor seals. These issues include the direct impact of oil spills, human interactions, food, competition, climatic factors, disease and habitat loss. This project deals with the issues of body condition and health status of harbor seals with the resulting data applying directly to issues of disease, food limitation and the impact of oil.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$7.2	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$153.8	$153.8	$119.3	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$161.0	$161.0	$126.5	
General Administration	$0.0	$0.0	$11.8	$11.8	$9.4	
Project Total	$0.0	$0.0	$172.8	$172.8	$135.9	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Program Manager	0.0	$0.0	1.3	$7.2
Intrm				
Rem				
Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95001
Project Title: Recovery of Harbor Seals from EVOS: Condition and Health Status
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Intrm	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
RSA with the University of Alaska - Fairbanks to conduct this project	$0.0	$153.8
Contractual Total	$0.0	$153.8

Project Number: 95001
Project Title: Recovery of Harbor Seals from EVOS: Condition and Health Status
Agency: AK Dept. of Fi[illegible] & Game

FORM 2B
PROJECT
DETAIL

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

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

07/14/93

1995

Printed: 9/12/94 11:19 AM

Project Number: 95001
Project Title: Recovery of Harbor Seals from EVOS: Condition and Health Status
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Recovery of Harbor Seals from EVOS: Condition and Health Status- This project collaborates with the inter-disciplinary and integrative marine mammals ecosystems program submission to EVOS. Outlined under the broad program direction, the goals of the combined collaborative projects are to investigate ecosystem wide questions addressing the recovery of marine mammal injured species, specifically, harbor seals. These issues include the direct impact of oil spills, human interactions, food, competition, climatic factors, disease and habitat loss. This project deals with the issues of body condition and health status of harbor seals with the resulting data applying directly to issues of disease, food limitation and the impact of oil.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$48.9	$48.9	$51.3	$0.0	$0.0	$0.0	$51.3
Travel	$0.0	$0.0	$12.4	$12.4	$10.1	$0.0	$0.0	$0.0	$10.1
Contractual	$0.0	$0.0	$15.7	$15.7	$16.1	$0.0	$0.0	$0.0	$16.1
Commodities	$0.0	$0.0	$21.6	$21.6	$21.9	$0.0	$0.0	$0.0	$21.9
Equipment	$0.0	$0.0	$29.6	$29.6	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$128.2	$128.2	$99.4	$0.0	$0.0	$0.0	$99.4
General Administration	$0.0	$0.0	$25.6	$25.6	$19.9	$0.0	$0.0	$0.0	$19.9
Project Total	$0.0	$0.0	$153.8	$153.8	$119.3	$0.0	$0.0	$0.0	$119.3
Full-time Equivalents (FTE)	0.7	0.0	1.5	1.5	4.9				

Dollar amounts are shown in thousands of dollars.

Report writing for this project will be a condition of the contract, no additional funds will be requested.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
M. Castellini	0.0	$0.0	3.0	$22.1
J.M. Castellini	0.0	$0.0	3.0	$12.2
B. Fadely	0.0	$0.0	6.0	$7.3
T. Zenteno	0.0	$0.0	6.0	$7.3
Personnel Total	0.0	$0.0	18.0	$48.9

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95001
Project Title: Recovery of Harbor Seals from EVOS: Condition and Health Status
Agency: University of Al[illegible] - Fairbanks

FORM 4A SUB-PROJECT CONTRACTUAL [illegible]IL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	8 RT Fairbanks/Anchorage @ 350 + 80 days field per diem @ $50/day	$0.0	$6.8
	2 RT Fairbanks/Anchorage for workshops @ $350 + 14 days per diem @ $170/day	$0.0	$3.1
	2 RT to Marine Mammal meeting in Orlando @ $700 + 12 days per diem @ $94	$0.0	$2.5
	Travel Total	$0.0	$12.4
Contractual:			
	Vet lab analysis	$0.0	$3.9
	Long distance phone charges	$0.0	$0.5
	Postage	$0.0	$0.2
	Cargo shipping	$0.0	$1.0
	Tuition for two graduate students for 2 semesters	$0.0	$10.1
	Contractual Total	$0.0	$15.7

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Project Number: 95001
Project Title: Recovery of Harbor Seals from EVOS: Condition and Health Status
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Intrm	400 assays for hemoglobin, ketone bodies, blood urea nitrogen and fatty acids @ $19/assay	$0.0	$7.6
	400 assay kits @ $13.50/kit	$0.0	$5.4
	400 sample preps @ $6.425/prep	$0.0	$2.6
	400 stress assays @ $3.825/assay	$0.0	$1.5
	Ultracold storage boxes 50 @ $10.00	$0.0	$0.5
1	Mustang suit @ $380	$0.0	$0.4
4	Water tight containers @ $155.00	$0.0	$0.6
	SYSTAT software	$0.0	$0.7
	Graphics software	$0.0	$0.5
	Plotting software	$0.0	$0.6
	Media	$0.0	$0.6
	Presentation media	$0.0	$0.6
	Commodities Total	$0.0	$21.6
Equipment:			
Rept	Microscope	$0.0	$1.4
Intrm	Shipper	$0.0	$1.0
	Speedvac	$0.0	$8.0
	Moisture analyzer	$0.0	$8.2
	Freezer	$0.0	$7.0
	Database Computer	$0.0	$3.0
	Shipping for the above items	$0.0	$1.0
	Equipment Total	$0.0	$29.6

Project Number: 95001
Project Title: Recovery of Harbor Seals from EVOS: Condition and Health Status
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Archaeological Site Restoration - Index Site Monitoring. This project continues tracking vandalism activities on sites in the oil spill area by concentrating monitor efforts on selected representative sites. Agency archaeologists will visit key sites over a period of years until vandalism is no longer a danger and that aspect of restoration will be complete.

Budget Category:	1994 Project No. 94007 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$258.5	$80.7	$97.5	$178.2	$96.5
Travel	$25.4	$1.5	$38.0	$39.5	$38.0
Contractual	$242.8	$90.1	$34.1	$124.2	$32.8
Commodities	$22.1	$1.0	$7.8	$8.8	$9.0
Equipment	$8.7	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$557.5	$173.3	$177.4	$350.7	$176.3
General Administration	$55.8	$18.4	$16.9	$35.3	$16.9
Project Total	$613.3	$191.7	$194.3	$386.0	$193.2
Full-time Equivalents (FTE)	0.0	1.2	1.4	2.5	0.0
Dollar amounts are shown in thousands of dollars.					

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

Comment

FY 94 Closeout/Report - $191.7

Project Description: Closeout/Report writing funds will provide for report writing for two major components of 94007: 1. Site Specific Restoration will report on DNR sites and provide a compilation of data from all 4 participating agencies to generate a final project report. In support of this effort data anlysis of samples currently being collected will continue and curation and repatriation of place as required by Federal and State law. 2. An Historic Preservation Protection Plan for impacted Communities within the spill area will be completed. Travel associated with this project will take place in October due to weather constraints and needs of local individuals whose input is essential to project completion.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: AK Dept. of Natural Resources

FORM 2A PROJECT DETAIL

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

Project Description: Archaeological Site Restoration - Index Site Monitoring. This project continues tracking vandalism activities on sites in the oil spill area by concentrating monitor efforts on selected representative sites. Agency archaeologists will visit key sites over a period of years until vandalism is no longer a danger and that aspect of restoration will be complete.

Budget Category:	1994 Project No. 94007 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$166.1	$80.7	$61.6	$142.3	$60.0
Travel	$10.7	$1.5	$20.0	$21.5	$20.0
Contractual	$109.2	$90.1	$26.5	$116.6	$25.0
Commodities	$8.8	$1.0	$4.0	$5.0	$5.0
Equipment	$2.9	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$297.7	$173.3	$112.1	$285.4	$110.0
General Administration	$32.6	$18.4	$11.1	$29.5	$10.8
Project Total	$330.3	$191.7	$123.2	$314.9	$120.8
Full-time Equivalents (FTE)		1.2	0.9	2.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Archaeologist II	7.0	$42.7		
Archaeologist I	6.0	$30.9		
Chief History & Archaeology	1.0	$7.1	1.0	$7.1
Project Manager			1.0	$6.5
Archaeologist II			5.0	$31.0
Archaeologist I			3.2	$17.0
Personnel Total	14.0	$80.7	10.2	$61.6

FY 94 Closeout/Report - $191.7

Project Description: Closeout/Report writing funds will provide for report writing for two major components of 94007: 1. Site Specific Restoration will report on DNR sites and provide a compilation of data from all 4 participating agencies to generate a final project report. In support of this effort data anlysis of samples currently being collected will continue and curation and repatriation of place as required by Federal and State law. 2. An Historic Preservation Protection Plan for impacted Communities within the spill area will be completed. Travel associated with this project will take place in October due to weather constraints and needs of local individuals whose input is essential to project completion.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Travel:		Reprt/Intrm	Remaining
REPT 94	Field travel 2 trips - Kodiak @ $500/trip airfare	$1.0	
REPT 94	Field travel 2 trips - homer @ $250/trip airfare	$0.5	
FY 95	Field travel 6 trips - Kodak @ $500 /trip airfare		$3.0
FY 95	Field travel 6 trips - Homer @ $250/trip airfare		$1.5
FY 95	Field per diem @ $115/day x 45 days		$5.2
FY 95	Curation travel 4 trips - Fairbanks @ $500		$2.0
	perdiem Fairbanks $115/day x 12 days		$1.4
FY 95	Repatriation travel to Kodiak/Prot Graham/Nanawalek		$2.0
FY 95	per diem @ $115/day x 10 days		$1.2
FY 95	Air freight		$3.7
	Travel Total	$1.5	$20.0
Contractual:			
Rept 94	Report duplication	$2.5	
Rept 94	Curation - no set fee, dependent upon collection size which will be determined at end of field season	$68.3	
Rept 94	Sediment sample processing - 17 samples @ $500/sample	$8.5	
Rept 94	14C/Radiocarbon dating - 20 samples @ $265/sample	$5.3	
Rept 94	Film processing	$1.5	
Rept 94	Photo printing	$1.5	
Rept 94	Repatriation - no set fee, dependent on number of remains and their location	$2.5	
FY 95	Report duplication		$2.5
FY 95	Curation - no set fee, dependent upon collection size which will be determined at end of field season		$10.0
FY 95	Sediment sample processing - 3 samples @ $500/sample		$1.5
FY 95	14C/Radiocarbon dating - 10 samples @ $250/sample		$2.5
FY 95	Air charter 12.7 hours @ $275/hour		$3.5
FY 95	Boat charter 4 days @ $1,000/day		$4.0
FY 95	Film processing ($1.0) and photoprinting ($1.5)		$2.5
	Contractual Total	$90.1	$26.5

Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	94 Office supplies (paper, printer cartridges, tape, staples, etc.)	$1.0	
FY	95 Office supplies (paper, printer cartridges, tape, staples, etc.)		$1.5
FY	95 Field supplies (bags, tags,pencils, trowels, etc.)		$2.5
	Commodities Total	$1.0	$4.0
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Archaeological Site Restoration - Index Site Monitoring. This project continues tracking vandalism activities on sites in the oil spill area by concentrating monitor efforts on selected representative sites. Agency archaeologists will visit key sites over a period of years until vandalism is no longer a danger and that aspect of restoration will be complete.

Budget Category:	1994 Project No. 94007 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$20.7	$0.0	$13.8	$13.8	$14.0	
Travel	$10.2	$0.0	$8.0	$8.0	$8.0	
Contractual	$79.0	$0.0	$2.3	$2.3	$2.3	
Commodities	$2.5	$0.0	$1.9	$1.9	$2.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$112.4	$0.0	$26.0	$26.0	$26.3	
General Administration	$8.6	$0.0	$2.2	$2.2	$2.3	
Project Total	$121.0	$0.0	$28.2	$28.2	$28.6	
Full-time Equivalents (FTE)		0.0	0.2	0.2		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Archaeologist GS-13			1.4	$8.7
Archaeologist GS-11			1.0	$5.1
Personnel Total	0.0	$0.0	2.4	$13.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Interior, National Park Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Field travel - Katmai Coast, 6 trips @ $1,000/trip		$6.0
	Per diem 12 days @ $160/day		$2.0
	Travel Total	$0.0	$8.0
Contractual:			
Rept			
Intrm	Film processing		$1.3
	Photo printing		$1.0
	Contractual Total	$0.0	$2.3

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1995

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Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Interior - National Park Service

FORM 3B
SUB-
PROJECT
DETAIL

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm Office suplies (printer cartridges, paper, pencils, etc.)		$1.0
Field supplies (bags, tags, tape, pencils, trowels)		$0.9
Commodities Total	$0.0	$1.9
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Interior - National Park Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Archaeological Site Restoration - Index Site Monitoring. This project continues tracking vandalism activities on sites in the oil spill area by concentrating monitor efforts on selected representative sites. Agency archaeologists will visit key sites over a period of years until vandalism is no longer a danger and that aspect of restoration will be complete.

Budget Category:	1994 Project No. 94007 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$15.5	$0.0	$8.3	$8.3	$8.5	
Travel	$2.5	$0.0	$2.5	$2.5	$2.5	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$18.0	$0.0	$10.8	$10.8	$11.0	
General Administration	$2.3	$0.0	$1.2	$1.2	$1.3	
Project Total	$20.3	$0.0	$12.0	$12.0	$12.3	
Full-time Equivalents (FTE)		0.0	0.1	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Archaeologist GS - 12			1.5	$8.3
Personnel Total	0.0	$0.0	1.5	$8.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95007A

Project Title: Archaeological Site Restoration- Index Site Monitoring

Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Four field trips - Kodiak @ $325		$1.3
	8 days per diem @ $150/day		$1.2
	Travel Total	$0.0	$2.5
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Interior, Fish & Wildlife Service

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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1995

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Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
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DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Archaeological Site Restoration - Index Site Monitoring. This project continues tracking vandalism activities on sites in the oil spill area by concentrating monitor efforts on selected representative sites. Agency archaeologists will visit key sites over a period of years until vandalism is no longer a danger and that aspect of restoration will be complete.

Budget Category:	1994 Project No. 94007 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$56.2	$0.0	$13.8	$13.8	$14.0	
Travel	$2.0	$0.0	$7.5	$7.5	$7.5	
Contractual	$54.6	$0.0	$5.3	$5.3	$5.5	
Commodities	$10.8	$0.0	$1.9	$1.9	$2.0	
Equipment	$5.8	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$129.4	$0.0	$28.5	$28.5	$29.0	
General Administration	$12.3	$0.0	$2.4	$2.4	$2.5	
Project Total	$141.7	$0.0	$30.9	$30.9	$31.5	
Full-time Equivalents (FTE)		0.0	0.2	0.2		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Archaeologist - GS 11			2.1	$13.8
Personnel Total	0.0	$0.0	2.1	$13.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Agriculture, Forest Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Field travel 8 trips Chenega/Tatitlek @ $350		$2.8
	24 days per diem (3/trip) @ $150/day		$3.6
	Field travel 2 trips Cordova @ $200		$0.4
	4.5 days per diem Cordova @ $160/day		$0.7
	Travel Total	$0.0	$7.5
Contractual:			
Rept			
Intrm	Air charter 15 hours @ $275/hour		$4.1
	Film processing		$0.6
	Photo printing		$0.6
	Contractual Total	$0.0	$5.3

Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm Office supplies (printer cartridges, paper, pencils, etc.)		$1.0
Field supplies (bags, tags, tape, pencils, trowels, etc.)		$0.9
Commodities Total	$0.0	$1.9
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

06/01/94

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Project Number: 95007A
Project Title: Archaeological Site Restoration - Index Site Monitoring
Agency: Dept. of Agriculture, Forest Service

FORM 3B
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PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Site SEW-488 Archeological Site Restoration - The intent of this project is to conduct site specific restoration activities at an archeological site on Knight Island in Prince William Sound. Impacts to the site require mitigation through data collection as well as site stabilization. The Louis Bay Lamp Site, SEW-488, was discovered during the Exxon Valdez Oil Spill cleanup program. Injury to the site consists of oiling during high pressure water treatment and unmonitored cleanup activities. The '94/Report/'95 Interim column funds report writing for Project 94007 Site Specific Archaeological Restoration.

Budget Category:	1994 Project No. 94007 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$49.8	$28.0	$39.0	$67.0	$14.0	
Travel	$0.0	$0.0	$2.2	$2.2	$0.0	
Contractual	$52.8	$0.0	$32.0	$32.0	$0.0	
Commodities	$10.8	$0.0	$1.5	$1.5	$0.0	
Equipment	$5.8	$0.0	$1.0	$1.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$119.2	$28.0	$75.7	$103.7	$14.0	
General Administration	$11.2	$4.2	$8.1	$12.3	$2.1	
Project Total	$130.4	$32.2	$83.8	$116.0	$16.1	
Full-time Equivalents (FTE)		0.8	0.9	1.6	0.0	

Dollar amounts are shown in thousands of dollars.

	Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Archaeologist GS-11	3.0	$12.6		
	Archaeologist Tech GS-9	3.0	$8.8		
	Archaeologist Tech GS-7	3.0	$6.6		
Rem	Program Manager			1.0	$4.8
	Principle Investigator			4.0	$16.0
	Archaeologist GS-9			4.0	$14.0
	Archaeologist GS-7			1.4	$4.2
	Personnel Total	9.0	$28.0	10.4	$39.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

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Project Number: 95007B
Project Title: Site SEW-488 Archaeological Site Restoration
Agency: Dept. of Agriculture, Forest Service

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Rountrip float plane trip to Lamp Oil site for staff		$2.2
	Travel Total	$0.0	$2.2
Contractual:			
Rept			
Intrm	Contract with Chugach Alaska Corporation for preservation of artifacts		$32.0
	Contractual Total	$0.0	$32.0

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1995

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Project Number: 95007B
Project Title: Site SEW-488 Archaeological Site Restoration
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Supplies and materials		$1.5
	Commodities Total	$0.0	$1.5
Equipment:			
Rept			
Intrm	Equipment		$1.0
	Equipment Total	$0.0	$1.0

07/14/93

1995

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Project Number: 95007B
Project Title: Site SEW-488 Archaeological Site Restoration
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: Killer Whale Monitoring in Prince William Sound

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$46.6	$46.6		If Project No. 95014 were also funded, there would be an overall cost-savings of $22.7K
Travel		$0.0	$4.0	$4.0		
Contractual		$0.0	$25.2	$25.2		
Commodities		$0.0	$11.0	$11.0		
Equipment		$0.0	$0.0	$0.0		
Administrative Costs		$0.0	$0.0	$18.1		
Subtotal	$0.0	$0.0	$86.8	$104.9	$0.0	
General Administration		$0.0	$8.8	$8.8	$0.0	
Project Total	$0.0	$0.0	$95.6	$113.7	$0.0	
Full-time Equivalents (FTE)		0.0	1.0	1.0		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Manager, NOAA			1.0	$5.0
Principal Investigator			4.0	$15.2
Field Biologist			3.5	$8.8
Photographic Analyst			2.0	$7.0
Biometrician			1.0	$3.8
Computer Technician			1.0	$2.1
Benefits @ 12%				$4.7
Personnel Total	0.0	$0.0	12.5	$46.6

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

Project Number: 95013
Project Title: Killer Whale Monitoring in Prince William Sound
Agency: North Gulf Oceanic Society

FORM 2A PROJECT DETAIL

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	4 RT Homer/Anchorage at $170/trip		$0.7
	3 RT Homer/Cordova at $327/Trip		$1.0
	1 RT Homer/Fairbanks at $325/trip		$0.3
	1 RT Homer/Seattle at $600/trip		$0.6
	14 days per diem at $100/day		$1.4
	Travel Total	$0.0	$4.0
Contractual:			
Rept	27' research vessel w/o operator 70 days at $170/day		$11.2
Intrm	43' research vessel w/o operator 20 days at $700/day		$14.0
	Contractual Total	$0.0	$25.2

07/14/93

1995

Project Number: 95013
Project Title: Killer Whale Monitoring in Prince William Sound
Agency: North Gulf Oceanic Society

FORM 2A
PROJECT
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Commodities:		Reprt/Intrm	Remaining

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Rept Intrm	Telephone		$0.4
	Food, $12/person for 190 days		$2.7
	Film processing, 300 rolls at $15/roll		$4.5
	Fuel, 25 gal/day/$1.30/gal for 90 days		$2.9
	Postage/Shipping		$0.5
	Commodities Total	$0.0	$11.0
Equipment:			
Rept Intrm			
	Equipment Total	$0.0	$0.0

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1995

Project Number: 95013
Project Title: Killer Whale Monitoring in Prince William Sound
Agency: North Gulf Oceanic Society

FORM 2B
PROJECT
DETAIL

Printed: 9/12/94 11:22 AM

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: Predation by Killer Whales in Prince William Sound: Feeding Behavior and Distributions of Predators and Prey

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$97.6	$97.6		If Project No. 95013 were also funded, there would be an overall cost-savings of $22.7K
Travel		$0.0	$5.4	$5.4		
Contractual		$0.0	$14.0	$14.0		
Commodities		$0.0	$6.8	$6.8		
Equipment		$0.0	$5.5	$5.5		
Administrative Costs		$0.0	$0.0	$32.7		
Subtotal	$0.0	$0.0	$129.3	$162.0	$0.0	
General Administration		$0.0	$15.6	$15.6	$0.0	
Project Total	$0.0	$0.0	$144.9	$177.6	$0.0	
Full-time Equivalents (FTE)		0.0	1.9	1.9		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Benefits (12%)				$3.8
Intrm Program Manager, NOAA			1.0	$5.0
Principal Investigator			3.0	$11.4
Field biologist			2.0	$5.2
Geneticist			3.0	$10.5
Acoustic analyst			2.0	$5.2
Trophic Modeler			6.0	$35.7
Computer Technician			6.0	$20.8
Personnel Total	0.0	$0.0	23.0	$97.6

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95014
Project Title: Predation by Killer Whales in PWS
Agency: North Gulf Oceanic Society

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	2 RT Vancouver/PWS at $550/trip		$1.1
	1 RT Homer/Anchorage at $250		$0.3
	2 RT Cordova/Anchorage at $200		$0.4
	20 days per diem in Anchorage @ $120/day		$2.4
	10 days per diem in Cordova at $120/day		$1.2
	Travel Total	$0.0	$5.4
Contractual:			
Rept	27' research vessel w/o operator 20 days at $170/day		$3.4
Intrm	43' research vessel w/o operator 10 days at $700/day		$7.0
	Hydrophone/receiver maintainance (1 year)		$3.6
	Contractual Total	$0.0	$14.0

07/14/93

1995

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Project Number: 95014
Project Title: Predation by Killer Whales in Prince William Sound
Agency: North Gulf Oceanic Society

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Telephone		$1.0
	Food, $12/person for 70days		$0.8
	Fuel, 25 gal/day/$1.30/gal for 30 days		$1.0
	Postage/Shipping		$0.7
	Genetic lab/field supplies		$2.3
	Office, Computer supplies		$1.0
	Commodities Total	$0.0	$6.8
Equipment:			
Rept	Scale, nets, hydrophones, misc. equip.		$1.6
Intrm	Dart guns and biopsy darts		$0.7
	Remote hydrophones and monitors		$3.2
	Equipment Total	$0.0	$5.5

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Project Number: 95014
Project Title: Predation by Killer Whales in PWS
Agency: North Gulf Oceanic Society

FORM 2B
PROJECT
DETAIL

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

Project Description: Partitioning of Primary Production Between Pelagic and Benthic Communities- This investigation on particle and POC flux will have strong relevance to understanding the role of carbon flux partitioning in the supply of food to pelagic primary consumers and to the benthic system. The specific objectives of this study are: 1) to estimate the time-series variations in the natural vertical fluxes of particulate organic carbon (POC) in PWS, and the partitioning of the flux between fecal pellets and loss of intact diatom cells via sinking, 2) to establish the relationship between our data on time-series changes in the POC fluxes and the timing and biomass of phytoplankton chles that Drs. McRoy and Eslinger have proposed to measure ad the time series changes in hydrodynamics that would be recorded at the C-lab and other buoy stations in PWS, and 3) to integrate the water column POC flux data with the sediment POC accumulation rate estimates that are available from our previous work in PWS. This will assist in assessing the demand and consumption of POC by benthos and the rates of orgamnic matter remineralization and burial.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$197.1	$197.1	$142.2	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$204.3	$204.3	$142.2	
General Administration	$0.0	$0.0	$14.9	$14.9	$10.0	
Project Total	$0.0	$0.0	$219.2	$219.2	$152.2	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Intrm Rem Program Manager	0.0	$0.0	1.3	$7.2
Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
Reimbursable services agreement with the University of Alaska to conduct this project	$0.0	$197.1
Contractual Total	$0.0	$197.1

Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: AK Dept. of F[illegible] & Game

FORM 2B
PROJECT
DETAIL

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

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

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Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Partitioning of Primary Production Between Pelagic and Benthic Communities- This investigation on particle and POC flux will have strong relevance to understanding the role of carbon flux partitioning in the supply of food to pelagic primary consumers and to the benthic system. The specific objectives of this study are: 1) to estimate the time-series variations in the natural vertical fluxes of particulate organic carbon (POC) in PWS, and the partitioning of the flux between fecal pellets and loss of intact diatom cells via sinking, 2) to establish the relationship between our data on time-series changes in the POC fluxes and the timing and biomass of phytoplankton chles that Drs. McRoy and Eslinger have proposed to measure ad the time series changes in hydrodynamics that would be recorded at the C-lab and other buoy stations in PWS, and 3) to integrate the water column POC flux data with the sediment POC accumulation rate estimates that are available from our previous work in PWS. This will assist in assessing the demand and consumption of POC by benthos and the rates of orgamnic matter remineralization and burial.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$46.6	$46.6	$46.6	$0.0	$0.0	$0.0	$46.6
Travel	$0.0	$0.0	$9.7	$9.7	$6.5	$0.0	$0.0	$0.0	$6.5
Contractual	$0.0	$0.0	$70.0	$70.0	$63.4	$0.0	$0.0	$0.0	$63.4
Commodities	$0.0	$0.0	$2.0	$2.0	$2.0	$0.0	$0.0	$0.0	$2.0
Equipment	$0.0	$0.0	$36.0	$36.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$164.3	$164.3	$118.5	$0.0	$0.0	$0.0	$118.5
General Administration	$0.0	$0.0	$32.9	$32.9	$23.7	$0.0	$0.0	$0.0	$23.7
Project Total	$0.0	$0.0	$197.1	$197.1	$142.2	$0.0	$0.0	$0.0	$142.2
Full-time Equivalents (FTE)	0.0	0.0	0.8	0.8	1.1				
	Dollar amounts are shown in thousands of dollars.								

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
S. Naidu	0.0	$0.0	3.0	$34.1
B. Finney	0.0	$0.0	1.0	$7.0
M.S. Student	0.0	$0.0	6.0	$5.5
Personnel Total	0.0	$0.0	10.0	$46.6

Report will be a condition of the RSA, no additional funds will be requested for report writing for this project.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: University of [illegible]ka - Fairbanks

FORM 3A
SUB-
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	4 RT Fairbanks/Valdez @ $842 + 12 days per diem @ $138	$0.0	$5.0
	4 RT Fairbanks/Anchorage @ $300 + 14 days per diem @ $170	$0.0	$3.6
	One RT Fairbanks/San Diego @ $800 +3 days per diem @ $115	$0.0	$1.1
	Travel Total	$0.0	$9.7
Contractual:			
Intrm	Subcontract with PWSSC to deploy and recover subsurface mooring in PWS.	$0.0	$58.0
Intrm	Long distance communications	$0.0	$0.5
Intrm	Report preparation	$0.0	$2.0
	Biochemical analyses	$0.0	$3.0
	Shipping	$0.0	$4.0
	One semester tuition for M.S. student	$0.0	$2.5
	Contractual Total	$0.0	$70.0

Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: University of Alaska - Fairbanks

FORM 3B
SUB-PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Glassware, filters, chemicals	$0.0	$2.0
	Commodities Total	$0.0	$2.0
Equipment:			
Rept	Two sediment traps @ $18,000/trap	$0.0	$36.0
Intrm			
	Equipment Total	$0.0	$36.0

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

Project Description: Partitioning of Primary Production Between Pelagic and Benthic Communities- This investigation on particle and POC flux will have strong relevance to understanding the role of carbon flux partitioning in the supply of food to pelagic primary consumers and to the benthic system. The specific objectives of this study are: 1) to estimate the time-series variations in the natural vertical fluxes of particulate organic carbon (POC) in PWS, and the partitioning of the flux between fecal pellets and loss of intact diatom cells via sinking, 2) to establish the relationship between our data on time-series changes in the POC fluxes and the timing and biomass of phytoplankton chles that Drs. McRoy and Eslinger have proposed to measure ad the time series changes in hydrodynamics that would be recorded at the C-lab and other buoy stations in PWS, and 3) to integrate the water column POC flux data with the sediment POC accumulation rate estimates that are available from our previous work in PWS. This will assist in assessing the demand and consumption of POC by benthos and the rates of orgamnic matter remineralization and burial.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$0.0	$0.0	$12.6	$12.6	$0.0
Travel	$0.0	$0.0	$2.6	$2.6	$0.0
Contractual	$0.0	$0.0	$19.1	$19.1	$0.0
Commodities	$0.0	$0.0	$1.5	$1.5	$0.0
Equipment	$0.0	$0.0	$12.5	$12.5	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$48.3	$48.3	$0.0
General Administration	$0.0	$0.0	$9.7	$9.7	$0.0
Project Total	$0.0	$0.0	$58.0	$58.0	$0.0
Full-time Equivalents (FTE)	0.7	0.0	0.2	0.2	1.1

Dollar amounts are shown in thousands of dollars.

Comment	94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$0.0	$0.0
Travel	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$0.0	$0.0
General Administration	$0.0	$0.0	$0.0	$0.0
Project Total	$0.0	$0.0	$0.0	$0.0

Budget for FFY 96 is unknown at this time

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
D. Salmon	0.0	$0.0	1.0	$6.9
Technician	0.0	$0.0	1.0	$5.7
Personnel Total	0.0	$0.0	2.0	$12.6

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
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Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: Prince William Sound Science Center

FORM 4A SUB-PROJECT CONTRACTUAL DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	2 RT lower 48/Cordova @$750 + 8 days per diem @ $140	$0.0	$2.6
	Travel Total	$0.0	$2.6
Contractual:			
Intrm			
Intrm	Subcontract witha marine engineer to design, deploy and recover a subsurface mooring in the central PWS.	$0.0	$10.6
Intrm	Vessel charter for the deployment and recovery of mooring 4 days @ $1.5	$0.0	$6.0
	Acoustic release command gear usage for deployment and recovery		$2.0
	Long distance phone charges, FAX, and E-mail		$0.5
	Contractual Total	$0.0	$19.1

Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Marine hardware	$0.0	$1.0
	Misc. supplies	$0.0	$0.5
	Commodities Total	$0.0	$1.5
Equipment:			
Rept	One Acoustic release	$0.0	$10.0
Intrm	Lines, buoys, anchors for mooring	$0.0	$2.5
	Equipment Total	$0.0	$12.5

Project Number: 95018
Project Title: Partitioning of Primary Production Between Pelagic and Benthic Communities
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: Three species of marine birds and one pinniped were listed as injured by the Exxon Valdez oil spill. One hypothesis of their failure to recover is that adverse changes have occurred in their prey base. Tufted puffins have proven an excellent and efficient sampler of the forage fish community, providing a relatively simple annual index of the distribution and relative abundance of forage fish. This project will assess forage fish species communities near sea bird colonies, compare normal sampling methods with the "puffin" sampling techniques applied elsewhere, assess timing and magnitude of puffin predation on commercially important fish.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$149.0	$149.0	$124.2	
Travel		$0.0	$15.0	$15.0	$15.0	
Contractual		$0.0	$20.0	$20.0	$20.0	
Commodities		$0.0	$10.0	$10.0	$5.0	
Equipment		$0.0	$45.0	$45.0	$20.0	
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$239.0	$239.0	$184.2	
General Administration		$0.0	$23.8	$23.8	$20.0	
Project Total	$0.0	$0.0	$262.8	$262.8	$204.2	
Full-time Equivalents (FTE)		0.0	4.3	4.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Principal Investigator			3.0	$21.0
Wilflife Biologist GS 9			12.0	$44.0
Biotechnician 12 @ 3 months)			36.0	$84.0
Personnel Total	0.0	$0.0	51.0	$149.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95019
Project Title: Distribution and abundance of forage fish as indicated by puffin diet sampling
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Commercial air		$3.0
vessel charter		$8.0
per diem		$4.0
Travel Total	$0.0	$15.0
Contractual:		
Rept		
Intrm		
taxonomy and enumeration of forage fish		$20.0
Contractual Total	$0.0	$20.0

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Project Number: 95019
Project Title: Food limitations on recovery of injured resources: an ecosystem approach to restoration of marine birds; distribution and abundance of forage fish as indicated by puffin diet sampling.
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Food		$6.0
Clothing		$2.0
Fuel		$2.0
Commodities Total	$0.0	$10.0
Equipment:		
Rept		
Intrm		
Rubber boats		$18.0
outboards		$12.0
safety gear		$6.0
tents and portables		$7.0
misc		$1.0
sampling gear-screens, vials, formalin)		$1.0
Equipment Total	$0.0	$45.0

Project Number: 95019
Project Title: Food limitation on recovery of injured resources: an ecosystem approach to the restoration of marine birds; distribution and abundance or forage fish as indicated by puffin sampling
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: Common murres were among the vertebrate species most seriously injured by the Exxon Valdez Oil Spill. . This project will test the hypothesis that failure of the species to recover is a result of food availability limiting breeding success and survival. Forage range, primary food areas, nursery and wintering areas will be studied.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$107.0	$107.0	$107.0	
Travel		$0.0	$10.0	$10.0	$10.0	
Contractual		$0.0	$10.0	$10.0	$10.0	
Commodities		$0.0	$30.0	$30.0	$30.0	
Equipment		$0.0	$54.0	$54.0	$39.0	
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$211.0	$211.0	$196.0	
General Administration		$0.0	$16.8	$16.8	$16.8	
Project Total	$0.0	$0.0	$227.8	$227.8	$212.8	
Full-time Equivalents (FTE)		0.0	2.3	2.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Principlal Investigator			6.0	$42.0
Wildlife Biologist GS 9			12.0	$44.0
Biotechnicians 3 at 3 mo			9.0	$21.0
Personnel Total	0.0	$0.0	27.0	$107.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95021
Project Title: Seasonal movements and pelagic habitat use by common murres from the Barren Island
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
commercial air (inc. freight)		$3.0
vessel charter		$5.0
per diem		$2.0
Travel Total	$0.0	$10.0
Contractual:		
Rept		
Intrm		
veterinarian for implants		$10.0
Contractual Total	$0.0	$10.0

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Project Number: 95021
Project Title: Seasonal movements and pelagic habitat use by common murres from the Barren Islands.
AgencyDept. of Interior, National Biological Survey:

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PROJECT
DETAIL

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1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
food		$4.0
clothing (safety gear)		$1.0
fuel		$1.0
ARGOS PTT monitoring		$24.0
Commodities Total	$0.0	$30.0

Equipment:		
Rept		
Intrm		
LED depth recorders (30 @ 100		$3.0
Satellite transmitters (20@2K0		$40.0
Rubber boat		$3.0
Outboard		$2.0
Safety gear - survival suits		$2.0
Tents and portables		$2.0
Misc		$2.0
Equipment Total	$0.0	$54.0

Project Number: 95021
Project Title: Seasonal movements and pelagic habitat use by common murres from Barren Ilands
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: This study will estimate relative foraging efficiencies in mixed-species aggregates of birds and mammals feeding on small schooling fish to test food-limiting hypotheses. Results will be useful in developing indices of population size, distribution for fish-eating birds/mammals, estimate morality to small fish from these predators, and better understand shifts in food web structure.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$94.8	$94.8	$94.8	
Travel		$0.0	$10.6	$10.6	$10.6	
Contractual		$0.0	$23.0	$23.0	$17.5	contractual includes university adm
Commodities		$0.0	$8.9	$8.9	$8.9	admin costs not included
Equipment		$0.0	$29.9	$29.9	$0.0	in general admin
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$167.2	$167.2	$131.8	
General Administration		$0.0	$15.8	$15.8	$15.4	
Project Total	$0.0	$0.0	$183.0	$183.0	$147.2	
Full-time Equivalents (FTE)		0.0	0.0	0.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept				
Intrm				
Personnel Total	0.0	$0.0	0.0	$94.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95022
Project Title: Foraging efficiencies at temporary food patches
Agency: Dept. of Interior, National Biological Survey

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
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	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel Total	$0.0	$10.6
Contractual:		
Rept		
Intrm		
Contractual Total	$0.0	$23.0

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1995

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Project Number: 95022
Project Title: Foraging efficiencies at temporary food patches
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Commodities Total	$0.0	$8.9
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$29.9

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1995

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Project Number: 95022
Project Title: Foraging efficiencies at temporary food patches
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: The project will define food web relationships of key species in the pelagic ecosystem, assess seasonal, annual, decadal, and regional, variation in the diets of injured marine birds, and examine if suspected shifts in food habits have occurred that may impact level of recovery related to the oil spill.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$52.0	$52.0	$52.0	
Travel		$0.0	$21.0	$21.0	$21.0	
Contractual		$0.0	$67.5	$67.5	$67.5	this includes admin contracts not i
Commodities		$0.0	$10.0	$10.0	$12.0	not in general admin
Equipment		$0.0	$5.0	$5.0	$5.0	
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$155.5	$155.5	$157.5	
General Administration		$0.0	$12.5	$12.5	$12.5	
Project Total	$0.0	$0.0	$168.0	$168.0	$170.0	
Full-time Equivalents (FTE)		0.0	1.0	1.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept				
Intrm				
Personnel Total	0.0	$0.0	12.0	$52.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95023
Project Title: food web relationships of pelagic species exhibiting long-term declines.
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
travel and vessel		$21.0
Travel Total	$0.0	$21.0
Contractual:		
Rept		
Intrm		
Contractual Total	$0.0	$67.5

07/14/93

1995

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Project Number: 95023
Project Title: food-web relationships of pelagic species exhibiting long-term declines.
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Commodities Total	$0.0	$5.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

07/14/93

1995

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Project Number: 95023
Project Title: food-web relationships of pelagic species exhibiting long-term declines.
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Enhancement of Prince William Sound Pink Salmon Stocks - This proposal is designed to rehabilitate rather that study depressed populations of wild pink and chum salmon as well as subsistence, commercial and recreational fisheries dependent on those salmon populations.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$7.2	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$49.8	$114.7	$164.5	$166.2	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$49.8	$121.9	$171.7	$173.4	
General Administration	$0.0	$3.5	$9.1	$12.6	$12.7	
Project Total	$0.0	$53.3	$131.0	$184.3	$186.1	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Program Manager	0.0	$0.0	1.3	$7.2
Intrm				
Rem				
Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

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Project Number: 95024
Project Title: Enhancement of PWS Pink Salmon Stocks
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Intrm	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with Eyak Native Village to complete this project	$49.8	$114.7
Contractual Total	$49.8	$114.7

Project Number: 95024
Project Title: Enhancement of PWS Pink Salmon Stocks
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

07/14/93

1995

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Project Number: 95024
Project Title: Enhancement of PWS Pink Salmon Stocks
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Enhancement of Prince William Sound Pink Salmon Stocks - This proposal is designed to rehabilitate rather that study depressed populations of wild pink and chum salmon as well as subsistence, commercial and recreational fisheries dependent on those salmon populations.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$0.0	$32.3	$97.2	$129.5	$136.1
Travel	$0.0	$1.3	$2.6	$3.9	$3.9
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$1.2	$0.0	$1.2	$1.5
Equipment	$0.0	$8.5	$0.0	$8.5	$3.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$43.3	$99.8	$143.1	$144.5
General Administration	$0.0	$6.5	$14.9	$21.4	$21.7
Project Total	$0.0	$49.8	$114.7	$164.5	$166.2
Full-time Equivalents (FTE)	0.0	0.8	2.3	3.0	0.0
Dollar amounts are shown in thousands of dollars.					

Comment	94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$32.3	$0.0	$136.1
Travel	$0.0	$1.3	$0.0	$3.9
Contractual	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$1.2	$0.0	$1.5
Equipment	$0.0	$8.5	$0.0	$3.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$43.3	$0.0	$144.5
General Administration	$0.0	$6.5	$0.0	$21.7
Project Total	$0.0	$49.8	$0.0	$166.2

Report writing for this project will be a condition of the contract, no additional funds will be requested.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm	Project leader	3.0	$14.0	9.0	$42.2
Intrm	Fisheries Biologist	3.0	$12.5	9.0	$37.5
Intrm	Clerical staff	3.0	$5.8	9.0	$17.5
	Personnel Total	9.0	$32.3	27.0	$97.2

NEPA Cost:	$50.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95024
Project Title: Enhancement of PWS Pink Salmon Stocks
Agency: Eyak Native Villa

FORM 4A SUB-PROJECT CONTRACTUAL D IL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	6 RT Anchorage/Cordova @ $200 + 18 days per diem @ $150/day	$1.3	$2.6
	Travel Total	$1.3	$2.6
Contractual:			
Intrm		$0.0	$0.0
Intrm			
Intrm			
	Contractual Total	$0.0	$0.0

07/14/93

1995

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Project Number: 95024
Project Title: Enhancement of PWS Pink Salmon Stocks
Agency: Eyak Native Village

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Office supplies, paper, pens	$1.2	$0.0
	Commodities Total	$1.2	$0.0
Equipment:			
Intrm	Computer/software	$4.5	$0.0
Intrm	Copier	$3.0	$0.0
Intrm	Printer	$1.0	$0.0
	Equipment Total	$8.5	$0.0

07/14/93

1995

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Project Number: 95024
Project Title: Enhancement of PWS Pink Salmon Stocks
Agency: Eyak Native Village

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Sea ducks are important avian components of the PSW ecosystem, particularly in winter. This study will examine factors limiting recovery of sea ducks and other injured resources with which they interact. The study is comprised of two related components: survival and movements, and foraging ecology. Species of emphasis will be harlequin ducks, Barrow's goldeneye, and white-winged scoters.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$165.4	$165.4	$150.4	
Travel	$0.0	$0.0	$8.0	$8.0	$8.0	
Contractual	$0.0	$0.0	$122.0	$122.0	$98.0	
Commodities	$0.0	$0.0	$12.0	$12.0	$12.0	
Equipment	$0.0	$0.0	$66.3	$66.3	$10.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$373.7	$373.7	$278.4	
General Administration	$0.0	$0.0	$33.4	$33.4	$29.4	
Project Total	$0.0	$0.0	$407.1	$407.1	$307.8	
Full-time Equivalents (FTE)	0.0	0.0	3.5	3.5	3.0	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95025A

Project Title: Factors affecting revovery of sea ducks and their prey

Agency: Dept. of Interior, National Biological Survey

FORM 2A PROJECT DETAIL

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

Project Description: Sea ducks are important avian components of the PSW ecosystem, particularly in winter. This study will examine factors limiting recovery of sea ducks and other injured resources with which they interact. The study is comprised of two related components: survival and movements, and foraging ecology. Species of emphasis will be harlequin ducks, Barrow's goldeneye, and white-winged scoters.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$17.4	$17.4	$17.4	
Travel		$0.0	$4.0	$4.0	$4.0	
Contractual		$0.0	$14.0	$14.0	$14.0	
Commodities		$0.0	$6.0	$6.0	$6.0	
Equipment		$0.0	$10.0	$10.0	$2.5	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$51.4	$51.4	$43.9	
General Administration		$0.0	$3.6	$3.6	$3.6	
Project Total	$0.0	$0.0	$55.0	$55.0	$47.5	
Full-time Equivalents (FTE)		0.0	0.3	0.3	0.3	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Wildlife Biologist GS 11			3.6	$17.4
Personnel Total	0.0	$0.0	3.6	$17.4

NEPA Cost: $0.0
*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95025A
Project Title: Factors affecting recovery of sea ducks and their prey
Sub-Project::
Agency: Dept. of Interior, Fish& Wildlife Service

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Rail to Whittier		
Air to Cordova		
Per diem		
Travel Total	$0.0	$4.0
Contractual:		
Rept		
Intrm		
Boat charter at 1.4K/day-10 d		$14.0
Contractual Total	$0.0	$14.0

06/01/94

1995

Printed: 9/12/94 11:27 AM

Project Number: 95025A
Project Title: Factors affecting recovery of sea ducks and their prey
Sub-Project:
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Food - field		$2.0
Fuel		$2.5
Printing		$1.5
Commodities Total	$0.0	$6.0
Equipment:		
Rept		
Intrm		
Field equipment		$6.0
safety gear		$2.0
misc.		$2.0
Equipment Total	$0.0	$10.0

Project Number: 95025A
Project Title: Factors affecting recovery of sea ducks and their prey
Sub-Project:
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Sea ducks are important avian components of the PSW ecosystem, particularly in winter. This study will examine factors limiting recovery of sea ducks and other injured resources with which they interact. The study is comprised of two related components: survival and movements, and foraging ecology. Species of emphasis will be harlequin ducks, Barrow's goldeneye, and white-winged scoters.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$148.0	$148.0	$133.0	
Travel		$0.0	$4.0	$4.0	$4.0	
Contractual		$0.0	$108.0	$108.0	$84.0	
Commodities		$0.0	$6.0	$6.0	$6.0	
Equipment		$0.0	$56.3	$56.3	$7.5	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$322.3	$322.3	$234.5	
General Administration		$0.0	$29.8	$29.8	$25.8	
Project Total	$0.0	$0.0	$352.1	$352.1	$260.3	
Full-time Equivalents (FTE)		0.0	3.2	3.2		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Wildlife Biologist-PI-GS 11			12.0	$58.0
Research Biologist GS 9			12.0	$46.0
Biotechnician GS 5			12.0	$29.0
Veterinarian			2.2	$15.0
Personnel Total	0.0	$0.0	38.2	$148.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95025A

Project Title: Factors affecting recovery of sea ducks and their prey

Sub-Project:

Agency: Dept. of Interior, National Biological Survey

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
rail to Whittier		
air to Cordova		
per diem		
Travel Total	$0.0	$4.0
Contractual:		
Rept		
Intrm		
air charter		$55.0
boat 15 days at 1.4		$21.0
body composition		$25.0
food habits		$5.0
statistical		$2.0
Contractual Total	$0.0	$108.0

06/01/94

1995

Printed: 9/12/94 11:27 AM

Project Number: 95025A
Project Title: Factor affecting recovery of sea ducks and their prey
Sub-Project:
Agency: Dept of Interior, National Biological Survey

FORM 3B
SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
food		$2.0
fuel		$2.5
printing		$1.5
Commodities Total	$0.0	$6.0
Equipment:		
Rept		
Intrm		
radios 150 at $175		$26.3
field equipment		$15.0
safety gear		$10.0
misc		$5.0
Equipment Total	$0.0	$56.3

06/01/94

1995

Printed: 9/12/94 11:27 AM

Project Number: 95025A
Project Title: Factor affecting recovery of sea ducks and their prey
Sub-Project:
Agency: Dept of Interior, National Biological Survey

FORM 3B
SUB-
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: This project will monitor the recovery, define seasonal patterns of habitat use, and evaluate the health of sea otters relative to sea otter density and levels of oil contamination . Foraging behavior, reproductive rates, and physiological measures will be used as indicators of population status and recovery. A soundwide survey of abundance and distribution will be conducted to monitor recovery.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$46.7	$46.7	$52.0	
Travel		$0.0	$15.0	$15.0	$5.0	
Contractual		$0.0	$73.4	$73.4	$16.0	
Commodities		$0.0	$6.0	$6.0	$1.5	
Equipment		$0.0	$10.0	$10.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$151.1	$151.1	$74.5	
General Administration		$0.0	$12.1	$12.1	$8.9	
Project Total	$0.0	$0.0	$163.2	$163.2	$83.4	
Full-time Equivalents (FTE)		0.0	1.1	1.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Project manager GS 14			0.5	$3.7
Wildlife Biologist GS 11			6.0	$25.0
Biotechnician GS 6			6.0	$18.0
Personnel Total	0.0	$0.0	12.5	$46.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95025B
Project Title: Sea otter abundance and distribution, food habits and population assessment
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
2 trips to Whittier with boat		$1.5
15 RT to Cordova by air at 220 ea		$3.3
2 round trip from Indiana-Purdue Univ to Anchorage for Co-PI at 800 ea		$1.6
Per diem for Co-PI 2 weeks at 150/day		$2.1
Per diem field		$2.0
Per diem Cordova/Whittier/New Chenega		$4.5
Travel Total	$0.0	$15.0
Contractual:		
Rept		
Intrm		
Boat charter		$29.4
air charter		$32.0
blood assays		$2.0
immune function assays		$10.0
Contractual Total	$0.0	$73.4

Project Number: 95025B
Project Title: Sea otter abundance and distribution, food habits and population assessment
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
fuel, 2000 gal at 3.0		$6.0
Commodities Total	$0.0	$6.0
Equipment:		
Rept		
Intrm		
Equipment maintenance and repair		$5.0
Safety equip. and misc.		$5.0
Equipment Total	$0.0	$10.0

07/14/93

1995

Printed: 9/12/94 11:28 AM

Project Number: 95025B
Project Title: Sea otter abundance and distribution, food habits and population assessment project
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: Injured pigeon guillemots and river otters will be used as indicators of environmental stress resulting from oil contamination because of their positions as top predators in the PWS ecosystem. Physiological measures based on blood chemistry and cell counts will be examined in guillemots. Guillemot nest sites and otter latrines will be identified and food-related samples collected for stable isotope analyses to assess trophic integrity. Risk assessments will be generated based on the project results.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$47.9	$47.9	$50.8	includes graduate student tuition
Travel		$0.0	$5.0	$5.0	$5.5	
Contractual		$0.0	$86.6	$86.6	$87.9	
Commodities		$0.0	$27.3	$27.3	$21.9	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$166.8	$166.8	$166.1	
General Administration		$0.0	$13.2	$13.2	$13.8	
Project Total	$0.0	$0.0	$180.0	$180.0	$179.9	
Full-time Equivalents (FTE)		0.0	1.7	1.7	1.7	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Research Professor			1.5	$13.7
Research Professor			1.0	$6.6
Graduate Student			12.0	$13.5
Graduate Tuition			0.0	$4.8
Technicians			6.0	$9.3
Personnel Total	0.0	$0.0	20.5	$47.9

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

Printed: 9/12/94 11:29 AM

Project Number: 95025C
Project Title: Pigeon guillemots and river otters as bioindicators of nearshore ecosystem health in PWS
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm			
	Fai-Valdez 8RT at 380		$3.0
	Sitka-Valdez air at 460		$0.5
	Per diem		$1.0
	travel to meeting		$0.5
	Travel Total	$0.0	$5.0
Contractual:			
Rept			
Intrm	details are provided in study plan please refer		
	admin services		$3.5
	equip rental		$52.2
	office		$4.9
	ADFG contract		$10.0
	Boat charter 30 d at 350		$10.5
	stable isotope		$4.5
	publication		$1.0
	Contractual Total	$0.0	$86.6

Project Number: 95025C
Project Title: Pigeon guillemot and river otters as bioindicators of ecosystem health in PWS
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	please refer to study plan		
food			$6.5
field supplies			$4.0
lab supplies			$7.5
fuel			$6.3
misc			$3.0
	Commodities Total	$0.0	$27.3
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95025C
Project Title: Pigeon guillemot and river otters as bioindicators of nearshore ecosystem health in PWS
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: The project addresses the hypothesis that offshore oceanographic forces control settlement of the planktonic larvae of many invertebrates damaged by the spill, affecting the ability of the adult population to recover. The project will examine whether the distribution and abundance of larvae can be used as indicators of mesoscale circulation patterns, linking transport mechanisms with characteristics of which habitats may recovery more quickly.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$221.0	$221.0	$221.0	
Travel		$0.0	$26.0	$26.0	$26.0	
Contractual		$0.0	$103.0	$103.0	$93.0	
Commodities		$0.0	$8.0	$8.0	$8.0	
Equipment		$0.0	$31.0	$31.0	$17.0	
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$389.0	$389.0	$365.0	
General Administration		$0.0	$40.4	$40.4	$39.7	
Project Total	$0.0	$0.0	$429.4	$429.4	$404.7	
Full-time Equivalents (FTE)		0.0	5.5	5.5		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Research Biologist GS 12			8.0	$44.0
Oceanographer			4.0	$22.0
Biologist GS 9			12.0	$45.0
Biotechnicians-Field, 2			12.0	$32.0
Biotech-lab-3			30.0	$78.0
Personnel Total	0.0	$0.0	66.0	$221.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95025D
Project Title: Settlement rates of nearshore invertebrates, oceanographic processes and population recovery: Are they linked
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel Total	$0.0	$26.0
Contractual:		
Rept		
Intrm		
Contractual Total	$0.0	$103.0

07/14/93

1995

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Project Number: 95025D
Project Title: Settlement rates of nearshore invertebrates, oceanographic processes and population recovery: Are they linked
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
Commodities Total	$0.0	$8.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$31.0

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Project Number:95025D
Project Title: Settlement rates of nearshore invertebrates, oceanographic processes and population recovery: Are they linked
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: This project will investigate the documented shift in algal composition in the lower intertidal of sheltered rocky habitats in the Cook Inlet-Kenai Peninsula area that has potential to be long term and affect recovery of injured algal and invertebrate communities. The annual kelp Alaria normally dominates, but since the spill it has declined and perennials have increased. This project will address the recovery of this community and investigate mechanisms that could impact recovery.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$121.5	$121.5	$121.5	contractual includes university fixed contracting costs not included in the general admin category
Travel		$0.0	$8.1	$8.1	$8.1	
Contractual		$0.0	$56.0	$56.0	$56.0	
Commodities		$0.0	$3.0	$3.0	$3.0	
Equipment		$0.0	$4.5	$4.5	$4.5	
Capital Outlay		$0.0	$4.8	$4.8	$4.8	
Subtotal	$0.0	$0.0	$197.9	$197.9	$197.9	
General Administration		$0.0	$22.1	$22.1	$22.1	
Project Total	$0.0	$0.0	$220.0	$220.0	$220.0	
Full-time Equivalents (FTE)		0.0	2.0	2.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Principal Investigator			2.0	$16.4
Co-PI			2.0	$12.3
Technician II			12.0	$55.0
Tech 1-2 positions (3			6.0	$24.4
Data Tech II			2.0	$8.5
grad student tuition				$4.9
Personnel Total	0.0	$0.0	24.0	$121.5

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95025E
Project Title: Algal competition limiting recovery in the intertidal
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Travel:					Reprt/Intrm	Remaining
Rept						
Intrm						
	Jun-Sew-Jun	6 at 500	per diem	12 at 40		$3.5
	Jun-Fbx-Jun	1 at 600		3 at 140		$1.2
	Jun-Anch-Jun	2 at 400		8 at 110		$1.7
	Anc-Sew-Anc	2 at 100		2 at 40		$0.3
	Anc-Jun-Anc	1 at 500		3 at 180		$1.0
	Air Taxi	1 at 500		0		$0.5
				Travel Total	$0.0	$8.1
Contractual:						
Rept						
Intrm						
	vessel	20 at 2.3				$45.0
	computer lit search					$0.1
	telephone/fax					$0.5
	xerox					$0.1
	publication					$0.2
	freight					$0.5
	*university overhead = .2%					
	or 36.7, included partially in contractual and general overhead					
	9.6 added to make total figures correct					$9.6
				Contractual Total	$0.0	$46.4

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Project Number:95025E
Project Title: Algal competition limiting recovery in the intertidal
Agency:Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
office supplies		$0.5
field supplies		$1.0
computer supplies		$0.5
lab supplies		$1.0
Commodities Total	$0.0	$3.0
Equipment:		
Rept		
Intrm		
computer		$2.5
alaria culture tank		$2.0
Equipment Total	$0.0	$4.5

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Project Number: 95025E
Project Title: Algal competition limiting recovery in the intertidal
Agency:Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description:This project will examine the use of Musculus by sea ducks and sea otters in PWS. Evidence of use of Musculus, which is generally more abundant in oiled sites, may rule out prey availability as a factor limiting sea ducks and sea otters.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$3.2	$3.2	$3.2	
Travel		$0.0	$1.2	$1.2	$1.2	
Contractual		$0.0	$0.0	$0.0		
Commodities		$0.0	$0.6	$0.6	$0.6	
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$5.0	$5.0	$5.0	
General Administration		$0.0	$0.5	$0.5	$0.5	
Project Total	$0.0	$0.0	$5.5	$5.5	$5.5	
Full-time Equivalents (FTE)		0.0	0.1	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Technical support			1.0	$3.2
Personnel Total	0.0	$0.0	1.0	$3.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95025F
Project Title: The availability and utilization of Musculus spp. as food for sea ducks and sea otters.
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel Total	$0.0	$1.2
Contractual:		
Rept		
Intrm		
Contractual Total	$0.0	$0.0

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Project Number: 95025F
Project Title: The availability and utilization of Musculus spp. as food for sea ducks and sea otters.
Agency: Dept. of Interior National Biological Survey

FORM 2A
PROJECT
DETAIL

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
Commodities Total	$0.0	$0.6
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

Project Number: 95025F
Project Title: The availability and utilization of Musculus spp. as food for sea ducks and sea otters
Agency: Dept., of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: This project will examine patterns of recruitment in nearshore clam populations known to be significant prey for sea otters in PWS. The clam population was injured by the oil spill, but their recovery patterns are unknown. It is possible that damage to clams may contribute to failure of sea otters to recover.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$0.0	$0.0	$11.5	contractual includes university admin contract costs not included in general admin
Travel		$0.0	$12.5	$12.5	$12.5	
Contractual		$0.0	$56.8	$56.8	$57.6	
Commodities		$0.0	$20.0	$20.0	$20.0	
Equipment		$0.0	$28.0	$28.0	$14.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$117.3	$117.3	$115.6	
General Administration		$0.0	$4.0	$4.0	$5.8	
Project Total	$0.0	$0.0	$121.3	$121.3	$121.4	
Full-time Equivalents (FTE)		0.0	0.0	0.0		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept				
Intrm				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95025G
Project Title: Relation of Clam Population Structure to Recovery of Injured Nearshore Vertebrate Predators
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
airfare 5 trips, 2 people		$6.0
Transportation-Whitier		$0.5
Per diem		$6.0
Travel Total	$0.0	$12.5
Contractual:		
Rept		
Intrm		
Vessel charter (at 1.5/d)		$45.0
Admin		$11.8
Contractual Total	$0.0	$56.8

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Project Number: 95025G
Project Title: Relation of Clam Population Structure to Recovery of Injured Nearshore Vertebrate Predators
Agency: Dept. of Interior National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
SCUBA Tanks		$2.0
other SCUBA gear		$2.0
Collection/storage supplies		$12.5
computer supplies		$0.5
gasoline		$3.0
Commodities Total	$0.0	$20.0
Equipment:		
Rept		
Intrm		
SCUBA compressor		$11.0
microscope		$8.0
laptop computer		$4.0
binoculars		$2.0
spotting telescope/tripod		$3.0
Equipment Total	$0.0	$28.0

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Project Number: 95025G
Project Title: Relation of Clam Population Structure to Recovery of Injured Nearshore Vertebrate Predators
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: Clams, an injured resource, are an important food resource for sea otters in PWS, also injured. Dynamics of clams often are influenced by patterns of predation by invertebrates such as sea stars, crabs, and snails. This project will describe this predation and will examine if high rates of clam morality are limiting clam and sea otter recovery.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$4.9	$4.9	$4.9	Much of the contractual, commodities, and equipment costs listed in 95025G and 95025H are duplicates. Should both be funded the combined budget of the two would be greatly reduced.
Travel		$0.0	$12.5	$12.5	$12.5	
Contractual		$0.0	$55.9	$55.9	$56.2	
Commodities		$0.0	$12.5	$12.5	$12.5	
Equipment		$0.0	$28.0	$28.0	$9.2	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	Contractual includes university adm. contract costs not completely covered by general adm.
Subtotal	$0.0	$0.0	$113.8	$113.8	$95.3	
General Administration		$0.0	$4.6	$4.6	$4.7	
Project Total	$0.0	$0.0	$118.4	$118.4	$100.0	
Full-time Equivalents (FTE)		0.0	0.3	0.3		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Graduate student			4.0	$4.9
Personnel Total	0.0	$0.0	4.0	$4.9

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95025H
Project Title: Effects of predatory invertebrates on nearshore clam populations in PWS
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Airfare 5 trips, 2 people		$6.0
Transp. to Whittier		$0.5
Per diem		$6.0
Travel Total	$0.0	$12.5
Contractual:		
Rept		
Intrm		
vessel charter		$45.0
university adm. contract		$10.5
Contractual Total	$0.0	$55.5

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Project Number: 95025H
Project Title: Effects of predatory invertebrates on nearshore clam populations in PWS
Agency: Dept. of Interior, National Biological Survey

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
SCUBA tanks		$2.0
other SCUBA gear		$2.0
sample collection/storage		$5.0
computer supplies		$0.5
gas		$3.0
Commodities Total	$0.0	$12.5

Equipment:		
Rept		
Intrm		
SCUBA compressor		$11.0
microsope		$8.0
laptop computer		$4.0
binoculars		$2.0
spotting telescope/tripod		$3.0
Equipment Total	$0.0	$28.0

Project Number: 95025H
Project Title: Effects of predatory invertebrates in nearshore clam populations of PWS
Agency: Dept. of Interior, National Biological Survey

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95026

Project Title: Integration of Microbial and Chemical Sediment Data

Sub-Project:

Agency: AK Dept. of Environmental Conservation

FORM 2A PROJECT DETAIL

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

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

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

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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

FORM 3A SUB-PROJECT DETAIL

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

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

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

FORM 3B
SUB-
PROJECT
DETAIL

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

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

06/01/94

1995

Printed: 9/12/94 11:32 AM

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

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$0.0	$0.0	$45.5	$45.5	$0.0
Travel	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$0.0	$4.0	$4.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$49.5	$49.5	$0.0
General Administration	$0.0	$0.0	$6.8	$6.8	$0.0
Project Total	$0.0	$0.0	$56.3	$56.3	$0.0
Full-time Equivalents (FTE)	0.0	0.0	0.7	0.7	0.0
Dollar amounts are shown in thousands of dollars.					

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

Comment

This subproject is to analyze and interpret 33 hydrocarbon samples collected during the shoreline assessment for origin and toxicity. Three replicates must be run for each sample to permit source identification.

Some of the FFY 95 money will need to be rolled into FFY 96 to finish sample analysis. The amount to be rolled into FFY 96 will depend upon when the samples are collected and laboratory work load.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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

FORM 3A SUB-PROJECT DETAIL

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

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

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

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

06/01/94

1995

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

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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

FORM 3A SUB-PROJECT DETAIL

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

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

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

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$0.0	$0.0	$45.5	$45.5	$7.1
Travel	$0.0	$0.0	$1.0	$1.0	$0.0
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$0.0	$4.0	$4.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$50.5	$50.5	$7.1
General Administration	$0.0	$0.0	$6.8	$6.8	$1.1
Project Total	$0.0	$0.0	$57.3	$57.3	$8.2
Full-time Equivalents (FTE)	0.0	0.0	0.7	0.7	0.1
Dollar amounts are shown in thousands of dollars.					

Comment

This subproject is to analyze and interpret 35 hydrocarbon samples collected during the shoreline assessment for origin and toxicity.

Some of the FFY 95 money will need to be rolled into FFY 96 to finish sample analysis. The amount to be rolled into FFY 96 will depend upon when the samples are collected and laboratory work load.

The funds shown in FFY 96 are to participate in data analysis and report writing.

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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

FORM 3B
SUB-
PROJECT
DETAIL

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

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

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

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will re-survey the population of bald eagles in Prince William Sound (PWS) and compare the 1995 population with populations in prior years to determine if reductions in prey availability have reduced the number of eagles in PWS. The objectives are: to determine bald eagle population size; compare the 1995 population with populations in 1982 and 1989-91; and confirm that the population is following the increasing trajectory modeled based on previous survey data. This survey will help to confirm the recovery of bald eagles and alleviate concern created by the suspected reduction in prey availability. Methods: Stratified random plots will be flown by fixed wing aircraft using standard survey protocol.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$16.0	$16.0		Funding includes report writing for this project.
Travel		$0.0	$5.5	$5.5		
Contractual		$0.0	$18.0	$18.0		
Commodities		$0.0	$5.5	$5.5		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$45.0	$45.0	$0.0	
General Administration		$0.0	$3.7	$3.7	$0.0	
Project Total	$0.0	$0.0	$48.7	$48.7	$0.0	
Full-time Equivalents (FTE)		0.0	0.3	0.3		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Project Leader			1.0	$5.0
Pilot/Biologist			1.0	$5.0
Program Manager			1.2	$6.0
Personnel Total	0.0	$0.0	3.2	$16.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95029
Project Title: Population Survey of Bald Eagles in PWS, Alaska
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Transport survey crews to PWS		$4.5
Project leader travel from Juneau to Anchorage for meetings		$1.0
Travel Total	$0.0	$5.5
Contractual:		
Rept		
Intrm		
Aircraft rental		$18.0
Contractual Total	$0.0	$18.0

07/14/93

1995

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Project Number: 95029
Project Title: Population Survey of Bald Eagles in PWS, Alaska
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Aircraft fuel		$5.0
Maps, film, etc.		$0.5
Commodities Total	$0.0	$5.5
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

07/14/93

1995

Printed: 9/12/94 11:34 AM

Project Number: 95029
Project Title: Population Survey of Bald Eagles in PWS, Alaska
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

Project Description: This project would re-survey nest occupancy and productivity of bald eagles in PWS and contrast the results with productivity parameters found to be "normal" in studies of coastal Alaska eagle populations. The objectives are to: determine bald eagle productivity in PWS in 1995; compare 1995 and 1990 productivity in PWS with other coastal Alaska populations; and determine whether productivity is within normal bounds. This information is necessary to evaluate whether bald eagle populations injured by the spill are recovering as predicted based on population modeling. Standard nest productivity protocol will be followed.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$15.0	$15.0		Funding includes report writing for this project.
Travel		$0.0	$8.5	$8.5		
Contractual		$0.0	$52.0	$52.0		
Commodities		$0.0	$0.5	$0.5		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$76.0	$76.0	$0.0	
General Administration		$0.0	$5.9	$5.9	$0.0	
Project Total	$0.0	$0.0	$81.9	$81.9	$0.0	
Full-time Equivalents (FTE)		0.0	0.3	0.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Project Leader			1.0	$5.0
Observer			1.0	$4.0
Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	3.0	$15.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95030
Project Title: Productivity Survey of Bald Eagles in PWS, Alaska
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A
PROJECT
DETAIL

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

Travel:	Reprt/Intrm	Remaining
Rept		
Intrm		
Transport survey crew to Cordova (2-10 day trips)		$7.5
Project leader trips to Anchorage for meetings (1 trip)		$1.0
Travel Total	$0.0	$8.5
Contractual:		
Rept		
Intrm		
Helicopter (2 surveys @10 days @6hrs/day)		
Flight cost ($200./hr)		$24.0
Aircraft availability ($900./day)		$18.0
Pilot per diem ($100./day)		$2.0
Fuel cache (1,000 gal. blivet w/ hardware, BLM reimbursable)		$8.0
Contractual Total	$0.0	$52.0

07/14/93

1995

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Project Number: 95030
Project Title: Productivity Survey of Bald Eagles in PWS, Alaska
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Miscellaneous items (maps, film, etc.)		$0.5
Commodities Total	$0.0	$0.5
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

07/14/93

1995

Printed: 9/12/94 11:34 AM

Project Number: 95030
Project Title: Productivity Survey of Bald Eagles in PWS, Alaska
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: One explanation for the continued decline of the PWS Marbled Murrelet population is that food is limiting recovery by affecting murrelet reproductive success. This project will use two approaches to monitor murrelet productivity: i) observations of individual radio-tagged murrelets and their nesting success, and ii) at-sea surveys to assess juvenile/adult ratios at selected sites. Results from this study will compliment studies of forage fish abundance and distribution in relation to oceanographic characteristics. The project location is PWS.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$224.7	$224.7		FY95 costs include data analysis and report writing.
Travel		$0.0	$8.6	$8.6		
Contractual		$0.0	$125.0	$125.0		
Commodities		$0.0	$15.0	$15.0		
Equipment		$0.0	$29.0	$29.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$402.3	$402.3	$0.0	
General Administration		$0.0	$42.5	$42.5	$0.0	
Project Total	$0.0	$0.0	$444.8	$444.8	$0.0	
Full-time Equivalents (FTE)		0.0	5.4	5.4		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm	Project Leader, GS-11			13.0	$55.9
	Biologist, GS-9 (2)			26.0	$98.8
	Bio. Tech., GS-7			6.0	$15.0
	Bio. Tech., GS-5 (3)			14.0	$28.0
	Expediter			3.0	$10.0
	Project Manager			2.0	$11.0
	Program Manager			1.0	$6.0
	Personnel Total	0.0	$0.0	65.0	$224.7

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95031

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

Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Anchorage to Whittier: Boat transport - 2 trips @$1200./trip		$2.4
Anchorage to Whittier: 6 people - 3 trips @$100./trip		$1.8
Field per diem: 6 people - 110 days @$3./day		$2.0
Anchorage to Cordova: 4 trips @$360./trip		$1.4
Float plan trips to study sites: 4 trips @$250./trip		$1.0
* All travel includes per diem costs.		
Travel Total	$0.0	$8.6
Contractual:		
Rept		
Intrm		
Fuel delivery to PWS - 1 trip @$5K/trip		$5.0
Safety training - 6 people @$830./person		$5.0
Warehouse rental		$2.5
Truck rental		$2.5
Boat repair		$5.0
Float plane for FWS telemetry flights - 50 hrs. @$230./hr. (July & Aug.)		$11.5
Helicopter time for reaching nest sites - 10 hrs. @$600./ hr (Jun.)		$6.0
Contract for capture, radio-tagging tracking murrelets. Includes:		$87.5
Boat charter for 35 days		
2 experienced personnel - 45 field days and compilation time		
40 radio-tags		
90 hrs. plane time for tracking between late May thru early July		
supplies **Contractual Total**	$0.0	$125.0

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Project Number: 95031
Project Title: Reproductive Success as a Factor Affecting Recovery of Marbled Murrelets in PWS, Alaska
Agency: Dept. of Interior- Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
Food: 6 people - 110 days @$10./day		$6.6
Boat Fuel: 100 gals./day for 50 days (5000 gals. @$1.50/gal)		$7.5
Camp supplies (stove fuel, bug spray, etc.)		$0.9
Commodities Total	$0.0	$15.0
Equipment:		
Rept		
Intrm		
Safety equipment (floatation devices, VHF radios, etc.)		$5.0
Boat repair and equipment (anchor, propellers, canvas, etc.)		$10.0
Camp equipment (stoves, tents, lanterns, etc.)		$5.0
Telemetry equipment		$9.0
Equipment Total	$0.0	$29.0

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Project Number: 95031
Project Title: Reproductive Success as a Factor Affecting Recovery of Marbled Murrelets in PWS, Alaska
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: In PWS, kittiwakes are well suited to address the question of food limitation for seabirds. Kittiwakes prey on similar forage fish species as marbled murrelets, pigeon guillemots, and murres and act as indicator species of the availability of prey. The project proposed here will expand on the basic monitoring already being conducted by FWS by providing reasons for the continuing failure of kittiwakes to reproduce since the oil spill. Information about the availability and distribution of forage fishes in PWS generated by this project will also be useful for understanding food web relationships of other bird species that were injured by the oil spill, and the entire PWS ecosystem. The project location is PWS and Wooded, Chiswell and Barren Islands.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$106.9	$106.9	$110.1	Funding includes data analysis and report writing costs.
Travel		$0.0	$6.0	$6.0	$6.0	
Contractual		$0.0	$19.1	$19.1	$19.1	FFY97 $206.8 ($203.1 + 3% increase for personnel)
Commodities		$0.0	$15.0	$15.0	$15.0	
Equipment		$0.0	$34.1	$34.1	$35.0	FFY98 $210.7 ($206.8 + 3% increase for personnel)
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$181.1	$181.1	$185.2	
General Administration		$0.0	$17.4	$17.4	$17.9	
Project Total	$0.0	$0.0	$198.5	$198.5	$203.1	
Full-time Equivalents (FTE)		0.0	2.4	2.4	2.4	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Project Leader, GS-11			15.0	$64.3
Bio. Tech., GS-5 (4)			8.0	$15.6
Expediter			3.0	$10.0
Project Manager			2.0	$11.0
Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	29.0	$106.9

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95033
Project Title: Kittiwakes as Indicators of Forage Fish Availability
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Field Work:		
	Anchorage to Whittier: Boat transport - 3 trips @$1200./trip		$3.6
	Anchorage to Whittier: 5 people - 2 trips @$100./trip		$1.0
	Field per diem: 5 people - 90 days @$3./day		$1.4
	Travel Total	$0.0	$6.0
Contractual:			
Rept			
Intrm			
	Safety training - 5 people @$830./person (Watercraft Safety, Bear Safety, Firearms Safety)		$4.2
	Warehouse rental - for storing boat and field equipment		$2.5
	Truck rental - to tow boat from Anchorage to Whittier		$2.5
	Analysis of diet samples - Lab work of field collected samples		$5.9
	GIS analysis of field collected data		$4.0
	Contractual Total	$0.0	$19.1

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Project Number: 95033
Project Title: Kittiwakes as Indicators of Forage Fish Availability
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Field Supplies:		
	Food: 5 people - 90 days @$10./day		$4.5
	Boat Fuel: 100 gals./day for 64 days (6400 gals. @$1.50/gal)		$9.6
	Camp supplies (stove fuel, bug spray, etc.)		$0.9
	Commodities Total	$0.0	$15.0
Equipment:			
Rept			
Intrm			
	Safety equipment (flotation devices, VHF radios, etc.)		$5.0
	Boat repair and equipment (anchor, propellers, canvas, etc.)		$10.0
	Camp equipment (stoves, tents, lanterns, etc.)		$5.0
	Other equipment		$5.0
	Computer and software (desktop 486 PC) for analyzing collected data		$5.0
	Radio tags		$4.1
	Equipment Total	$0.0	$34.1

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Project Number: 95033
Project Title: Kittiwakes as Indicators of Forage Fish Availability
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The Pacific Seabird Group (PSG) proposes to host a symposium in Alaska during September or October 1995 to discuss the science of seabird restoration. PSG would invite and sponsor knowledgeable scientists from around the world to discuss the benefits and costs of every technique that has been used to restore seabirds. The symposium will provide state and federal trustees with a realistic approach to the most effective means of restoring Alaska's seabird colonies. Minutes of the meeting and general conclusions will be available in a report. A synthesis of the symposium's discussions and papers could be published, but is not included in this proposal.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$6.0	$6.0		[Note: Project work is done by sub-contractors. Personnel costs are for project managment within DOI.]
Travel		$0.0	$30.0	$30.0	$0.5	
Contractual		$0.0	$35.0	$35.0	$9.0	
Commodities		$0.0	$0.0	$0.0		
Equipment		$0.0	$0.0	$0.0		FY96 costs are for writing a final report.
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$71.0	$71.0	$9.5	
General Administration		$0.0	$3.4	$3.4	$0.6	
Project Total	$0.0	$0.0	$74.4	$74.4	$10.1	
Full-time Equivalents (FTE)		0.0	0.1	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95038
Project Title: Symposium on Seabird Restoration
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Air fare, lodging and food for 25 scientists to participate in a 3-day symposium in Alaska discussing seabird restoration. Under consideration are scientists from U.K., New Zealand, Australia, Africa, Canada, Latin America, and the United States. Depending on actual expenses, fewer or more scientists will be sponsored. We assume that three of the scientists live in Anchorage, for whom no air fares will be needed.		
	Symposium: Room and Board (25 x $470.)		$28.6
	Beyond North America air fares (8 x $1.0K)		
	West coast air fares (incl. Juneau, W. Canada) (8 x $0.5K)		
	East coast air fares (incl. E. Canada) (6 x $0.8K)		
	P.I. travel to Anchorage [one trip in FY96]: air fare (2 x $0.5K), per diem (2 x $0.2K)		$1.4
	Travel Total	$0.0	$30.0
Contractual:			
Rept			
Intrm	This work will be conducted entirely by subcontractors because the Pacific Seabird Group has no employees. While still under consideration, we envision sub-contracts with at least two and possibly three highly qualified seabird biologists who will organize and run the symposium and produce a final report. PSG might also hire a facilitator for the symposium.		$35.0
	Contractual Total	$0.0	$35.0

Project Number: 95038
Project Title: Symposium on Seabird Restoration
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

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

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Printed: 9/12/94 11:36 AM

Project Number: 95038
Project Title: Symposium on Seabird Restoration
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project is designed to monitor the recovery of murres (*Uria* spp)at colonies in the Gulf of Alaska affected by the *Exxon Valdez* oil spill. The FY95 work focuses on collecting productivity data in the Barren Islands. The Recovery Monitoring Strategy (RMS) calls for collecting this information at this site for 4 years, beginning in FY95. The RMS also calls for censusing colonies in the Barren, Chiswell, and Semidi islands, and at Ugaiushak, the Triplets, and Puale Bay on a 3 year schedule starting in FY96 to monitor population trends. Any FY96 productivity work will be a part of this larger restoration monitoring effort. The '94 Report/'95 Interim costs are for analyzing data and writing the report for work conducted in FY94 under 94039. Funding for FY95 include data analysis and report writing costs for FY95 data.

Budget Category:	1994 Project No. 94039 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$108.4	$25.2	$68.0	$93.2	$25.6
Travel	$14.5	$0.5	$28.7	$29.2	$1.6
Contractual	$57.0	$0.0	$0.0	$0.0	$2.0
Commodities	$14.4	$1.0	$10.0	$11.0	$0.0
Equipment	$12.6	$0.0	$6.8	$6.8	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$206.9	$26.7	$113.5	$140.2	$29.2
General Administration	$20.3	$3.8	$10.2	$14.0	$4.0
Project Total	$227.2	$30.5	$123.7	$154.2	$33.2
Full-time Equivalents (FTE)	3.4	0.7	1.8	2.5	0.8
Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Project Leader	4.0	$16.0	8.0	$32.0
Intrm	Bio. Science Tech., GS-7	0.0	$0.0	8.0	$19.2
	Bio. Science Tech., GS-6	3.5	$7.7	4.0	$8.8
	Project Manager, GS-12	0.3	$1.5	0.8	$4.0
	Program Manager, GS-12			0.8	$4.0
	Personnel Total	7.8	$25.2	21.6	$68.0

Comment

This budget reflects a new study design that focuses on collecting productivity data at E. Amatuli Island and E. Amatuli Light Rock and setting up time-lapse cameras at Nord Island to collect information on timing of nesting events and attendance of adults. A full-scale Nord Island component would add about $60.0K to the total costs listed here. The estimated cost of the FY95 work as presented here, including writing the report, is $156.7K (i.e. $123.7 + $33.0), which is $74.1K less than the previously funded FY94 budget.

[Note: Travel Costs for two workshop meetings in Anchorage are included in the FY96 portion of the budget.]

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95039
Project Title: Common Murre Productivity Monitoring
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Travel for interim includes trips from Homer to Anchorage for workshops and meetings.	$0.5	
Intrm			
	Six (6) helicopter round trips @$1.1/trip Homer-Barren Islands-Homer to transport personnel to & from field camps (the helicopters will be chartered through the Dept. of Interior , Office of Aircraft Services on an "as-needed basis" and are more efficient and cost effective than vessels for some needs)		$6.6
	Eight (8) days of charter vessel time @$2.15/day (to mobilize, demobilize and resupply the camp, & to check camera gear)		$17.2
	Two (2) round trip airfares to/from Homer for refuge volunteers @$0.9/person		$1.8
	Per diem for field crews (per diem for field personnel is $3/day x 420 person days = $1.26). This amount must be paid to all FWS employees and non-SCA volunteers for each day spent in the field; per diem for 2 refuge volunteers is $17/day x 110 days = $1.87		$3.1
	Travel Total	$0.5	$28.7
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Interim needs include photo developing, photo sleeves, data forms, etc.	$1.0	
Intrm			
	Food for 2 remote field camps for 4 people for 92 days @$12/day/person (368 person days x $12. = $4.4)		$4.4
	Fuel (kerosene, outboard gas & oil, blazo)		$0.9
	Other field supplies (e.g., batteries, maps, notebooks, film, tarps, new emergency signaling devices, video tapes, replacement of rubber boots, rain gear, ropes, fuel filters)		$1.2
	35 AVHR satellite images @0.1 each		$3.5
	[Note: FWS will supply all other camping gear and office supplies.]		
	Commodities Total	$1.0	$10.0
Equipment:			
Rept			
Intrm	1 data logger unit with temperature probe for taking water temperatures		$2.0
	Replacement of 1 time-lapse video camera with waterproof case		$2.0
	Replacement of 2 mustang suits @$0.4 each		$0.8
	Equipment repairs/cleaning (includes checking, cleaning and repairing, as necessary, binoculars, spotting scopes, cameras, radios, inflatable rafts, and outboard engines)		$2.0
	[Note: FWS will supply other necessary equipment, including boats, outboard engines, radios, tents, optics, and computers.]		
	Equipment Total	$0.0	$6.8

Project Number: 95039
Project Title: Common Murre Productivity Monitoring
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project is designed to restore populations of oystercatchers and pigeon guillemots by removing introduced foxes from Simeonof and Chernabura islands in the western Gulf of Alaska. The FY95 study is the follow-up work that is required to make certain that both islands are indeed fox-free (it normally takes two years to successfully remove foxes from islands). The '94 Report/'95 Interim costs are for analyzing data and writing the report for work conducted in FY94 under 94041. FY95 funding includes data analysis and report writing costs for FY95 data.

Budget Category:	1994 Project No. 94041 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$24.0	$16.0	$22.0	$38.0	$4.0
Travel	$17.0	$1.0	$11.8	$12.8	$1.6
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$13.2	$1.0	$4.5	$5.5	$0.0
Equipment	$26.2	$0.0	$4.5	$4.5	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$80.4	$18.0	$42.8	$60.8	$5.6
General Administration	$3.6	$2.4	$3.3	$5.7	$0.6
Project Total	$84.0	$20.4	$46.1	$66.5	$6.2
Full-time Equivalents (FTE)	1.0	0.6	0.7	1.3	0.3
Dollar amounts are shown in thousands of dollars.					

Comment

[Note: The target islands are remote and not inhabitated by people. Successful removal of foxes requires exerienced personnel familiar with the environments and methods for eradicating foxes. Contracting is not a viable option because experienced people are difficult to find at this time of year, and because of logistical costs (the FWS vessel Tiglax normally travels these waters and this helps minimize costs). Costs for two workshop meetings are included in the FY 96 portion of the budget.

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

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Manager, GS11	(0.5)*	$0.0	(1.0)*	$0.0
Project Leader, GS-11	(2.0)*	$0.0	(3.0*	$0.0
Temp. Biologist, GS-7	4.0	$9.6	4.0	$9.6
Temp. Biologist, GS-6	3.0	$6.4	3.0	$6.4
Program Manager			1.0	$6.0
Personnel Total	7.0	$16.0	8.0	$22.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95041
Project Title: Introduced Predator Removal from Islands
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Interim travel includes trips from Homer to Anchorage for workshops and meetings.	$1.0	
Intrm			
	Two (2) days of ship time on M/V Tiglax @$3.2K/day		$6.4
	Five (5) trips from Sand Point to Homer plus per diem (5 trips @$700./trip + 10 days per diem @$125./day)		$4.8
	Per diem for field (per diem for field personnel @$3./day x 200 person days) This daily amount must be paid to all FWS employees and non-SCA volunteers for each day spent in the field.		$0.6
	Travel Total	$1.0	$11.8
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

Project Number: 95041
Project Title: Introduced Predator Removal from Islands
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept Intrm	Interim costs include film developing, photo sleeves, data forms, etc.	$1.0	
	Food for field camps for 4 people for 40 days @$14./day/person (160 person days x $14./day)		$2.2
	Fuel (kerosene, gas and oil for outboard engines, blazo)		$1.0
	Office and other field data recording supplies (e.g., notebooks, tally counter, maps)		$0.3
	Trapping supplies (e.g., survey tape, stakes, lures/bait, ammunition)		$1.0
	[Note: All other necessary camping supplies will be furnished by FWS.]		
	Commodities Total	$1.0	$4.5
Equipment:			
Rept Intrm	Camping gear (e.g., rain gear, rubber boots, float-coats, gloves, sleeping bags & pads, ropes, tarps)		$2.0
	Equipment repairs/cleaning (includes checking, cleaning and repair, as necessary, binoculars, spotting scopes, cameras, radios, inflatable rafts, and outboard engines)		$2.5
	[Note: FWS will supply other necessary equipment, including a back-up outboard engine, additional radio equipment (e.g., hand-held radios and back-up radios), and other camping and trapping equipment.]		
	Equipment Total	$0.0	$4.5

Project Number: 95041
Project Title: Introduced Predator Removal from Islands
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

Project Description: The Cordova Ranger District proposes to work with the City of Cordova, the State of Alaska, and the Eyak Corporation, to identify degraded cutthroat habitat and develop a restoration or enhancement program. Although the areas identified so far are not on Forest Service land, adjacent Forest Service lands or recreation sites could be affected. In addition, if cutthroat populations in Eyak Lake and other areas are restored, there would be less fishing pressure on some of the small cutthroat stocks in streams on Forest Service lands.

Budget Category:	1994 Project No. 94043 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$13.0	$0.0	$19.1	$19.1		
Travel	$7.0	$0.0	$0.8	$0.8		
Contractual	$0.0	$0.0	$0.0	$0.0		
Commodities	$2.0	$0.0	$0.0	$0.0		
Equipment	$1.0	$0.0	$0.8	$0.8		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$23.0	$0.0	$20.7	$20.7	$0.0	
General Administration	$1.9	$0.0	$2.9	$2.9	$0.0	
Project Total	$24.9	$0.0	$23.6	$23.6	$0.0	
Full-time Equivalents (FTE)		0.0	0.7	0.7		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm GS-11 Fish Bio.			0.7	$3.2
GS-9 Fish Bio			1.0	$3.4
GS-7 Fish Tech			2.2	$6.5
GS-3 Fish Tech			2.0	$3.0
GS-4 Fish Tech			2.0	$3.0
Personnel Total	0.0	$0.0	7.9	$19.1

NEPA Cost:	$3.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95043A
Project Title: Cutthroat Trout Habitat Rehabilitation
Agency: USDA Forest Service

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Vehicle		$0.8
	Travel Total	$0.0	$0.8
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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1995

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Project Number: 95043A
Project Title: Cutthroat Trout Habitat Rehabilitation
Agency: USDA Forest Service

FORM 2A
PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL BUDGET PROPOSAL
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Commodities Total	$0.0	$0.0
Equipment:		
Rept		
Intrm		$0.8
Equipment Total	$0.0	$0.8

07/14/93

1995

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Project Number: 95043A
Project Title: Cutthroat Trout Habitat Rehabilitation
Agency: USDA Forest Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The objectives are to restore, improve, and enhance cutthroat trout and Dolly Varden rearing and spawning habitat in PWS. This project entails the use of some or all of the approved instream habitat techniques, including: channel blocks, boulder placement, cover logs and root wads, tree cover, bank cribs with cover logs, logs and bank shelters, single-wing and double wing deflectors, deflectors and cover logs, channel constrictors, cross logs and revetments, wedge dams, and K dams.

Budget Category:	1994 Project No. 94043G Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$9.0	$20.7	$62.2	$82.9		This is a request for reauthorization of funding. All funds requested are carryover on a two year project. NEPA completed in 1994. Field project to be completed in 1995.
Travel	$0.0	$0.0	$4.2	$4.2		
Contractual	$0.0	$0.0	$4.4	$4.4		
Commodities	$0.0	$0.0	$16.8	$16.8		
Equipment	$0.0	$0.0	$13.8	$13.8		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$9.0	$20.7	$101.4	$122.1	$0.0	
General Administration	$0.0	$3.1	$9.6	$12.7	$0.0	
Project Total	$9.0	$23.8	$111.0	$134.8	$0.0	
Full-time Equivalents (FTE)	0.0	0.4	1.4	1.8		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm	Resources Staff Officer GS - 11	1.0	$3.3	3.0	$9.9
	Fisheries Biologist GS - 11	2.0	$9.0	5.5	$24.8
	Fisheries Biologist detailer GS - 9	1.0	$5.2	2.0	$10.3
	Fisheries Tech, GS - 8	1.0	$3.2	2.5	$8.0
	Fisheries Tech GS - 7			3.5	$9.2
	Personnel Total	5.0	$20.7	16.5	$62.2

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95043B

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

Agency: Dept. of Agriculture, Forest Service

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Per Diem and Travel		$1.6
	Other Travel		$2.6
	Travel Total	$0.0	$4.2
Contractual:			
Rept			
Intrm	Air charter @ $400/hr x 11		$4.4
	Contractual Total	$0.0	$4.4

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Project Number: 95043B
Project Title: Cutthroat Trout and Dolly Varden Rehabilitation in Western Prince William Sound
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Field food @ $20/day x 120 days		$2.4
	Safety equipment		$1.0
	Sampling and monitoring equipment		$0.8
	Construction supplies		$4.3
	Field gear and camping supplies		$3.0
	Equipment maintenance		$1.0
	Fuel		$0.8
	Hand tools		$3.5
	Commodities Total	$0.0	$16.8
Equipment:			
Rept			
Intrm	Boat rental		$7.5
	Vehicle		$1.5
	Photo		$0.9
	Seasonal housing		$2.0
	Boat maintenance		$1.9
	Equipment Total	$0.0	$13.8

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1995

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Project Number: 95043B
Project Title: Cutthroat Trout and Dolly Varden Rehabilitation in Western Prince William Sound
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: *In Situ* Formation and Ecotoxicity of Hydrocarbon Degradation Products Produced by Ultramicrobacteria

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$74.0	$74.0		
Travel		$0.0	$4.0	$4.0		
Contractual		$0.0	$7.1	$7.1		
Commodities		$0.0	$2.0	$2.0		
Equipment		$0.0	$0.0	$0.0		
Indirect Costs		$0.0	$0.0	$36.4		
Subtotal	$0.0	$0.0	$87.1	$123.5	$0.0	
General Administration		$0.0	$11.6	$11.6	$0.0	
Project Total	$0.0	$0.0	$98.7	$135.1	$0.0	
Full-time Equivalents (FTE)		0.0	1.3	1.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm	Program Manager, NOAA			1.0	$5.0
	Principal Investigator			1.0	$8.0
	Co- Principal Investigator			11.0	$31.0
	Co-Principal Investigator			3.0	$14.0
	Benefits				$16.0
	Personnel Total	0.0	$0.0	16.0	$74.0

NEPA Cost:	$0.0
*Oct 1, 1994 - Dec 31, 1994	
**Jan 1, 1995 - Sep 30, 1995	

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1995

Project Number: 95044
Project Title: In Situ: Hydrocarbons
Agency: Institute of Marine Science, UAF

FORM 2A
PROJECT
DETAIL

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel		$4.0
	Travel Total	$0.0	$4.0
Contractual:			
Rept	Ship Time (Little Dipper)		$2.1
Intrm			
	Flow cytometry		$5.0
	Contractual Total	$0.0	$7.1

07/14/93

1995

Project Number: 95044
Project Title: In Situ: Hydrocarbons
Agency: Institute of Marine Science, UAF

FORM 2A
PROJECT
DETAIL

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm Isotopes and chemicals		$2.0
Commodities Total	$0.0	$2.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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1995

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Project Number: 95044
Project Title: In Situ: Hydrocarbons
Agency: Institute of Marine Science, UAF

FORM 2B
PROJECT
DETAIL

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

Project Description: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement- This project will analyze sockeye salmon scales collected in previous years to see the affect of the EVOS on growth rates of sockeye. The objectives of this study are: 1) Measure annual growth zones of sockeye before, during and after the spill from affected river systems, 2) compare trends in annual growth zone measurements of sockeye from systems affected by overescapement or oil in the marine environment with that of systems not affected, and 3) determine the relative magnitude of reduced sockeye growth in freshwater or first year at sea as a result of overescapement or the presence of oil in the marine environment and evaluate the recovery of sockeye growth in years subsequent to the spill.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$4.2	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$85.0	$85.0	$11.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$92.2	$92.2	$15.2	
General Administration	$0.0	$0.0	$7.0	$7.0	$1.4	
Project Total	$0.0	$0.0	$99.2	$99.2	$16.6	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Program Manager	0.0	$0.0	1.3	$7.2
Intrm				
Rem				
Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95048
Project Title: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Intrm	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with Natural Resources Consultants, Inc. to complete this project	$0.0	$85.0
Contractual Total	$0.0	$85.0

Project Number: 95048
Project Title: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement
Agency: AK Dept. of Fi[illegible] & Game

FORM 2B
PROJECT
DETAIL

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

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

Project Number: 95048
Project Title: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement- This project will analyze sockeye salmon scales collected in previous years to see the affect of the EVOS on growth rates of sockeye. The objectives of this study are: 1) Measure annual growth zones of sockeye before, during and after the spill from affected river systems, 2) compare trends in annual growth zone measurements of sockeye from systems affected by overescapement or oil in the marine environment with that of systems not affected, and 3) determine the relative magnitude of reduced sockeye growth in freshwater or first year at sea as a result of overescapement or the presence of oil in the marine environment and evaluate the recovery of sockeye growth in years subsequent to the spill.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$75.7	$75.7	$7.3	$0.0	$0.0	$0.0	$7.3
Travel	$0.0	$0.0	$2.4	$2.4	$1.7	$0.0	$0.0	$0.0	$1.7
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$0.0	$0.5	$0.5	$0.2	$0.0	$0.0	$0.0	$0.2
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$78.6	$78.6	$9.2	$0.0	$0.0	$0.0	$9.2
General Administration	$0.0	$0.0	$6.4	$6.4	$1.8	$0.0	$0.0	$0.0	$1.8
Project Total	$0.0	$0.0	$85.0	$85.0	$11.0	$0.0	$0.0	$0.0	$11.0
Full-time Equivalents (FTE)	0.0	0.0	1.1	1.1	0.2				

Dollar amounts are shown in thousands of dollars.

Report writing for this project will be a condition of the contract, no additional funds will be requested.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
1 Principal Investigator - Ruggerone	0.0	$0.0	2.5	$31.8
1 Co-Principal Investigator - Rogers	0.0	$0.0	0.5	$6.0
1 Technician	0.0	$0.0	10.0	$37.9
Personnel Total	0.0	$0.0	13.0	$75.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95048
Project Title: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement
Agency: Natural Resour[illegible]onsultants, Inc.

FORM 4A SUB-PROJECT CONTRACTUAL D[illegible]IL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	2 RT Seattle/Anchorage @ $825 + 6 days per diem @ $125/day	$0.0	$2.4
	Travel Total	$0.0	$2.4
Contractual:			
Intrm		$0.0	$0.0
Intrm			
Intrm			
	Contractual Total	$0.0	$0.0

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Project Number: 95048
Project Title: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement
Agency: Natural Resources Consultants, Inc.

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Fox Pro + Statistical Software (1 @ $300)	$0.0	$0.3
	Slides, mounts, camera film for scale reader	$0.0	$0.2
	Commodities Total	$0.0	$0.5
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

Project Number: 95048
Project Title: Historical Analysis of Sockeye Salmon Growth Among Populations Affected by Overescapement
Agency: Natural Resources Consultants, Inc.

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Project Description: Large-scale Coded Wire Tagging of PWS Herring: Large-scale coded wire tagging would provide an additional useful tool to estimate population size while providing important additional information on growth, health, fecundity, and migration patterns of herring. The objectives of the proposed project are to : 1) develop a large-scale coded wire tag release and recapture program for herring in PWS, 2) create a coded wire tag return data base that would be available to researchers working in Prince William Sound and other areas, and 3) assist researchers in analyzing coded wire tag returns to answer specific questions for research and management.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$20.4	$20.4	$64.4	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$13.5	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$194.8	$194.8	$37.1	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$3.3	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$376.5	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$215.2	$215.2	$494.8	$0.0	$0.0	$0.0	$0.0
General Administration	$0.0	$0.0	$16.7	$16.7	$20.0	$0.0	$0.0	$0.0	$0.0
Project Total	$0.0	$0.0	$231.9	$231.9	$514.8	$0.0	$0.0	$0.0	$0.0
Full-time Equivalents (FTE)	0.0	0.0	0.2	0.2					

Dollar amounts are shown in thousands of dollars.

Budget for FFY 96 is unknown at this time

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm ADF&G Field Support Personnel	0.0	$0.0	1.8	$14.4
Intrm Program Manager	0.0	$0.0	1.0	$6.0
Rem				
Personnel Total	0.0	$0.0	2.8	$20.4

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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PrProject Number: 95051
Project Title: Large Scale Coded Wire Tagging of Herring in PWS
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
Contract with Natural Resources Consultants to complete this project	$0.0	$194.8
Contractual Total	$0.0	$194.8

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1995

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Project Number: 95051
Project Title: Large Scale Coded Wire Tagging of Herring in PWS
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

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

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1995

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Project Number: 95051
Project Title: Large Scale Coded Wire Tagging of Herring in PWS
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Large-scale Coded Wire Tagging of PWS Herring: Large-scale coded wire tagging would provide an additional useful tool to estimate population size while providing important additional information on growth, health, fecundity, and migration patterns of herring. The objectives of the proposed project are to : 1) develop a large-scale coded wire tag release and recapture program for herring in PWS, 2) create a coded wire tag return data base that would be available to researchers working in Prince William Sound and other areas, and 3) assist researchers in analyzing coded wire tag returns to answer specific questions for research and management.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$73.8	$73.8	$64.4	$0.0	$0.0	$0.0	$64.4
Travel	$0.0	$0.0	$5.9	$5.9	$13.5	$0.0	$0.0	$0.0	$13.5
Contractual	$0.0	$0.0	$38.0	$38.0	$37.1	$0.0	$0.0	$0.0	$37.1
Commodities	$0.0	$0.0	$3.5	$3.5	$3.3	$0.0	$0.0	$0.0	$3.3
Equipment	$0.0	$0.0	$55.0	$55.0	$376.5	$0.0	$0.0	$0.0	$376.5
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$176.2	$176.2	$494.8	$0.0	$0.0	$0.0	$494.8
General Administration	$0.0	$0.0	$18.6	$18.6	$20.0	$0.0	$0.0	$0.0	$20.0
Project Total	$0.0	$0.0	$194.8	$194.8	$514.8	$0.0	$0.0	$0.0	$514.8
Full-time Equivalents (FTE)	0.7	0.0	0.7	0.7	1.1	Budget for FFY 96 is unknown at this time			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
3	Principal Investigators	0.0	$0.0	3.0	$39.0
2	Technician I	0.0	$0.0	4.1	$16.2
	Contractors Program Manager	0.0	$0.0	1.4	$18.6
	Personnel Total	0.0	$0.0	8.5	$73.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95051
Project Title: Large Scale Coded Wire Tagging of Herring in PWS
Agency: National Resources Consultants

FORM 4A SUB-PROJECT CONTRACTUAL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	2 RT Cordova/Seattle @ $437 + 60 days per diem @ $83/day	$0.0	$5.9
	Travel Total	$0.0	$5.9
Contractual:			
Intrm			
Intrm	Shipping	$0.0	$0.9
Intrm	Purse seine charter 15 days @ $2,475/day	$0.0	$37.1
	Contractual Total	$0.0	$38.0

Project Number: 95051
Project Title: Large Scale Coded Wire Tagging of Herring in PWS
Agency: National Resources Consultants

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Foul weather gear	$0.0	$0.5
	Tag scanning gear set up supplies	$0.0	$1.0
	Marine hardware	$0.0	$1.5
	Office supplies	$0.0	$0.5
	Commodities Total	$0.0	$3.5
Equipment:			
Rept	Mark-4 tagging machine (4 @ $13,000/unit)	$0.0	$52.0
Intrm	Tag scanning detector (1)	$0.0	$3.0
	Equipment Total	$0.0	$55.0

Project Number: 95051
Project Title: Large Scale Coded Wire Tagging of Herring in PWS
Agency: National Resources Consultants

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Community Involvement and Knowledge Transfer will coordinate science researchers with locally available support and knowledge to insure incorporation of local specialized knowledge in scientific studies. It will also allow knowledge gained from scientific studies to be available to local people.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$55.0	$55.0	$55.0	
Travel	$0.0	$0.0	$18.0	$18.0	$20.0	
Contractual	$0.0	$0.0	$139.5	$139.5	$150.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$212.5	$212.5	$229.0	
General Administration	$0.0	$0.0	$18.0	$18.0	$19.4	
Project Total	$0.0	$0.0	$230.5	$230.5	$248.4	
Full-time Equivalents (FTE)	0.0	0.0	0.8	0.8	0.0	

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: #REF!

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Agency: Alaska Department of Natural Resources

FORM 2A PROJECT DETAIL

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

Project Description: Community Involvement and Knowledge Transfer will coordinate science researchers with locally available support and knowledge to insure incorporation of local specialized knowledge in scientific studies. It will also allow knowledge gained from scientific studies to be available to local people.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$31.0	$31.0	$35.0	
Travel		$0.0	$2.0	$2.0	$4.0	
Contractual		$0.0	$139.5	$139.5	$150.0	
Commodities		$0.0	$0.0	$0.0	$0.0	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$172.5	$172.5	$189.0	
General Administration		$0.0	$14.4	$14.4	$15.8	
Project Total	$0.0	$0.0	$186.9	$186.9	$204.8	
Full-time Equivalents (FTE)		0.0	0.4	0.4		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Manager			5.0	$31.0
Personnel Total	0.0	$0.0	5.0	$31.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Alaska Department of Natural Resources

FORM 3A
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to monitor contract, local meetings		
	Port Graham, Chenega, Tatitlek 3 trips @ $333.00		$1.0
	Per diem (3 days/trip) 9 days @ $111.00/day		$1.0
	Travel Total	$0.0	$2.0
Contractual:			
Rept			
Intrm	Local implementation/coordination contract		$139.5
	Contractual Total	$0.0	$139.5

06/01/94

1995

Printed: 9/12/94 11:41 AM

Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Alaska Department of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm None		
Commodities Total	$0.0	$0.0
Equipment:		
Rept		
Intrm None		
Equipment Total	$0.0	$0.0

Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Alaska Department of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Community Involvement and Knowledge Transfer will coordinate science researchers with locally available support and knowledge to insure incorporation of local specialized knowledge in scientific studies. It will also allow knowledge gained from scientific studies to be available to local people.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$6.0	$6.0	$6.0	
Travel		$0.0	$4.0	$4.0	$4.0	
Contractual		$0.0	$0.0	$0.0	$0.0	
Commodities		$0.0	$0.0	$0.0	$0.0	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$10.0	$10.0	$10.0	
General Administration		$0.0	$0.9	$0.9	$0.9	
Project Total	$0.0	$0.0	$10.9	$10.9	$10.9	
Full-time Equivalents (FTE)		0.0	0.1	0.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Monitor			1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to monitor local meetings		$2.0
	Per diem 13 days @ $160.00/day		$2.0
	Travel Total	$0.0	$4.0
Contractual:			
Rept			
Intrm	None		
	Contractual Total	$0.0	$0.0

06/01/94

1995

Printed: 9/12/94 11:41 AM

Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm None		
Commodities Total	$0.0	$0.0
Equipment:		
Rept		
Intrm None		
Equipment Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Community Involvement and Knowledge Transfer will coordinate science researchers with locally available support and knowledge to insure incorporation of local specialized knowledge in scientific studies. It will also allow knowledge gained from scientific studies to be available to local people.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$6.0	$6.0	$6.0	
Travel		$0.0	$4.0	$4.0	$4.0	
Contractual		$0.0	$0.0	$0.0	$0.0	
Commodities		$0.0	$0.0	$0.0	$0.0	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$10.0	$10.0	$10.0	
General Administration		$0.0	$0.9	$0.9	$0.9	
Project Total	$0.0	$0.0	$10.9	$10.9	$10.9	
Full-time Equivalents (FTE)		0.0	0.1	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Monitor			1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95052

Project Title: Comm. Involve. & Use of Traditional Knowledge

Sub-Project:

Agency: Department of Interior

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to attend local meetings 6 trips @ $333.00		$2.0
	Per diem 13 days @ $160.00/day		$2.0
	Travel Total	$0.0	$4.0
Contractual:			
Rept			
Intrm	None		
	Contractual Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of the Interior

FORM 3B
SUB-
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm None		
Commodities Total	$0.0	$0.0
Equipment:		
Rept		
Intrm None		
Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 9/12/94 11:41 AM

Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of the Interior

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Community Involvement and Knowledge Transfer will coordinate science researchers with locally available support and knowledge to insure incorporation of local specialized knowledge in scientific studies. It will also allow knowledge gained from scientific studies to be available to local people.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$6.0	$6.0	$6.0	
Travel		$0.0	$4.0	$4.0	$4.0	
Contractual		$0.0	$0.0	$0.0	$0.0	
Commodities		$0.0	$0.0	$0.0	$0.0	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$10.0	$10.0	$10.0	
General Administration		$0.0	$0.9	$0.9	$0.9	
Project Total	$0.0	$0.0	$10.9	$10.9	$10.9	
Full-time Equivalents (FTE)		0.0	0.1	0.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Monitor			1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of Commerce

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to attend local meetings 6 trips @ $333.00		$2.0
	Per diem 13 days @ $160.00/day		$2.0
	Travel Total	$0.0	$4.0
Contractual:			
Rept			
Intrm	None		
	Contractual Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of Commerce

FORM 3B
SUB-
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm None		
Commodities Total	$0.0	$0.0
Equipment:		
Rept		
Intrm None		
Equipment Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: Department of Commerce

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: Community Involvement and Knowledge Transfer will coordinate science researchers with locally available support and knowledge to insure incorporation of local specialized knowledge in scientific studies. It will also allow knowledge gained from scientific studies to be available to local people.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$6.0	$6.0	$6.0	
Travel		$0.0	$4.0	$4.0	$4.0	
Contractual		$0.0	$0.0	$0.0	$0.0	
Commodities		$0.0	$0.0	$0.0	$0.0	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$10.0	$10.0	$10.0	
General Administration		$0.0	$0.9	$0.9	$0.9	
Project Total	$0.0	$0.0	$10.9	$10.9	$10.9	
Full-time Equivalents (FTE)		0.0	0.1	0.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Monitor			1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: U.S. Forest Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to attend local meetings 6 trips @ $333.00		$2.0
	Per diem 13 days @ $160.00/day		$2.0
	Travel Total	$0.0	$4.0
Contractual:			
Rept			
Intrm	None		
	Contractual Total	$0.0	$0.0

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Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: U.S. Forest Service

FORM 3B
SUB-PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm None		
Commodities Total	$0.0	$0.0
Equipment:		
Rept		
Intrm None		
Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 9/12/94 11:41 AM

Project Number: 95052
Project Title: Comm. Involve. & Use of Traditional Knowledge
Sub-Project:
Agency: U.S. Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The proposed project is a multidisciplinary endeavor to acquire ecological information from the past, using information gathered on biological species, on geomorphologic structures, and on archaeological remains. Information on climactic changes, species types and distributions, the effects of glaciation and tectonic events, and the role of humans as part of the ecosystems will be gathered and correlated. The goal is to establish an ecosystem baseline of the Prince William Sound, on decadal and millennial time scales, which will be usable by researchers into rates and degrees of contemporary species recovery, and which will be extendible to (or provide the basis for additional work considering) other areas affected by the EVOS.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$75.9	$75.9	$66.0	
Travel	$0.0	$0.0	$18.2	$18.2	$1.7	
Contractual	$0.0	$0.0	$9.5	$9.5	$10.5	
Commodities	$0.0	$0.0	$6.0	$6.0	$2.0	
Equipment	$0.0	$0.0	$20.0	$20.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$129.6	$129.6	$80.2	
General Administration	$0.0	$0.0	$12.0	$12.0	$10.6	
Project Total	$0.0	$0.0	$141.6	$141.6	$90.8	
Full-time Equivalents (FTE)	0.0	0.0	1.7	1.7	0.0	
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95055

Project Title: Prehistoric Ecological Baseline for Prince William Sound

Agency: USDA Forest Service

FORM 2A PROJECT DETAIL

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

Project Description: Project Description: The proposed project is a multidisciplinary endeavor to acquire ecological information from the past, using information gathered on biological species, on geomorphologic structures, and on archaeological remains. Information on climactic changes, species types and distributions, the effects of glaciation and tectonic events, and the role of humans as part of the ecosystems will be gathered and correlated. The goal is to establish an ecosystem baseline of the Prince William Sound, on decadal and millennial time scales, which will be usable by researchers into rates and degrees of contemporary species recovery, and which will be extendible to (or provide the basis for additional work considering) other areas affected by the EVOS.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$19.2	$19.2	$7.0	
Travel		$0.0	$5.5	$5.5	$0.0	
Contractual		$0.0	$0.0	$0.0	$0.0	
Commodities		$0.0	$0.6	$0.6	$0.0	
Equipment		$0.0	$0.0	$0.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$25.4	$25.4	$7.0	
General Administration		$0.0	$2.9	$2.9	$1.1	
Project Total	$0.0	$0.0	$28.2	$28.2	$8.1	
Full-time Equivalents (FTE)		0.0	0.6	0.6		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Co-Pi GS-11			3.0	$10.5
GS-7			1.6	$4.3
GS-5			2.0	$4.4
Personnel Total	0.0	$0.0	6.6	$19.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95055
Project Title: Prehistoric Ecological Baseline for Prince William Sound
Agency: USDA Forest Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Per diem and field reated		$2.2
	Float plane charter		$3.3
	Travel Total	$0.0	$5.5
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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1995

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Project Number: 95055
Project Title: Prehistoric Ecological Baseline for Prince William Sound
Agency: USDA Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm Field supplies		$0.6
Commodities Total	$0.0	$0.6
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 9/12/94 11:43 AM

Project Number: 95055
Project Title: Prehistoric Ecological Baseline for Prince William Sound
Agency: USDA Forest Service

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Project Description: The proposed project is a multidisciplinary endeavor to acquire ecological information from the past, using information gathered on biological species, on geomorphologic structures, and on archaeological remains. Information on climactic changes, species types and distributions, the effects of glaciation and tectonic events, and the role of humans as part of the ecosystems will be gathered and correlated. The goal is to establish an ecosystem baseline of the Prince William Sound, on decadal and millennial time scales, which will be usable by researchers into rates and degrees of contemporary species recovery, and which will be extendible to (or provide the basis for additional work considering) other areas affected by the EVOS.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$56.7	$56.7	$59.0	
Travel		$0.0	$12.7	$12.7	$1.7	
Contractual		$0.0	$9.5	$9.5	$10.5	
Commodities		$0.0	$5.4	$5.4	$2.0	
Equipment		$0.0	$20.0	$20.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$104.2	$104.2	$73.2	
General Administration		$0.0	$9.2	$9.2	$9.6	
Project Total	$0.0	$0.0	$113.4	$113.4	$82.8	
Full-time Equivalents (FTE)		0.0	1.2	1.2		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Co-Pi, Inst. of Marine Science			1.0	$7.1
Co-Pi, Dept. of Geology			0.5	$3.8
Co-Pi, AK Quarternary Center			1.5	$10.1
Technician			6.0	$27.5
Student			5.0	$5.6
Tuition for Student				$2.6
Personnel Total	0.0	$0.0	14.0	$56.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95055

Project Title: Prehistoric Ecological Baseline for Prince William Sound

Agency: University of Alaska, Fairbanks

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	RT Fairbanks-Anchorage (field word and EVOS workshops)		$1.0
	Per diem and field reated		$4.8
	Float plane charter		$6.9
	Travel Total	$0.0	$12.7
Contractual:			
Rept			
Intrm	Radiocarbon dating (40 samples @ $400 ea.)		$8.0
	Mass spectrometer analysis (400 samples @ $5 ea.)		$1.0
	Communications		$0.5
	Contractual Total	$0.0	$9.5

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Project Number: 95055
Project Title: Prehistoric Ecological Baseline for Prince William Sound
Agency: University of Alaska, Fairbanks

FORM 3B
SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Field supplies		$1.4
	Laboratory supplies		$1.5
	Mass spectrometer supplies (glassware, tubing, etc.)		$2.5
	Commodities Total	$0.0	$5.4
Equipment:			
Rept			
Intrm	Microscope		$16.0
	Cluster gauge for mass spectrometer		$2.5
	Baratron mamometer (2) for mass spectrometer		$1.5
	Equipment Total	$0.0	$20.0

06/01/94

1995

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Project Number: 95055
Project Title: Prehistoric Ecological Baseline for Prince William Sound
Agency: University of Alaska, Fairbanks

FORM 3B
SUB-PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

95057 - Movement of Larval and Juvenile Fishes Within Prince William Sound

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$173.0	$173.0		
Travel		$0.0	$21.4	$21.4		
Contractual		$0.0	$21.6	$21.6		
Commodities		$0.0	$18.8	$18.8		
Equipment		$0.0	$15.8	$15.8		
Indirect Costs (20% Total Direct Costs)		$0.0	$0.0	$50.0		
Subtotal	$0.0	$0.0	$250.6	$300.6	$0.0	
General Administration		$0.0	$27.5	$27.5	$0.0	
Project Total	$0.0	$0.0	$278.1	$328.1	$0.0	
Full-time Equivalents (FTE)		0.0	5.0	5.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Manager, NOAA			1.0	$5.0
Principal Investigator			4.5	$21.4
3 Technicians			15.8	$56.4
1 M.S. student			15.0	$13.6
4 Undergraduate Students			24.0	$36.7
Leave Accrual				$12.8
Benefits				$27.1
Personnel Total	0.0	$0.0	60.3	$173.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

Project Number: 95057
Project Title: Movement of Larval and Juvenile Fish
Agency: Institute of Marine Science, UAF

FORM 2A
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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	9 RT Fairbanks/Cordova @ $500/trip + $80/day perdiem x 3 people x 40 days		$14.1
	1RT Fairbanks/Anchorage @ $300 + $170/person/day per diem x 10 days x 1 person		$2.0
	1 RT Fairbanks/New York @ $750 + 7 days perdiem @ $178		$2.0
	1RT Fairbanks/Shanghai @ $1500 + 10 days per diem @ $176/day		$3.3
	Travel Total	$0.0	$21.4
Contractual:			
Rept			
Intrm			
	Communication (phone, FAX, photocopy)		$1.5
	Reprot preparation		$2.0
	Air freight Fairbanks/Cordova @ $0.50/lb		$1.0
	Air freight Cordova/Fairbanks @ $0.50/lb		$4.0
	Air freight Cordova/Seward @ $0.50/lb		$0.5
	Presentation preparation (photoprocessing, etc)		$2.5
	Consultant Services (JoEllen Hose)		$5.0
	Tuition (2 semesters @ $2,530)		$5.1
	Contractual Total	$0.0	$21.6

07/14/93

1995

Project Number: 95057
Project Title: Movement of Larval and Juvenile Fish
Agency: Institute of Marine Science, UAF

FORM 2A
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Commodities:		Reprt/Intrm	Remaining

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Rept Intrm			
	Office Supplies (floppy disks, paper, etc)		$1.0
	Jars (100 cases @ $75/case)		$7.5
	Formalin (25 gal @ $40/gal)		$1.0
	Isopropyl alcohol (4 drums @ $450/drum)		$1.8
	Vials (6 cases @ $250/case)		$1.5
	Replacement nets (various)		$1.5
	Flowmeters (6 @ $670)		4..5
	Messengers (10 @ $50 each)		$0.3
	Weights (3 sets @ $92)		$1.2
	Tripper mechanisms (3 @ $400 each)		$3.0
	Software (GIS Graphics)		
	Commodities Total	$0.0	$18.8
Equipment:			
Rept Intrm			
	Computer		$4.5
	Printer		$3.3
	Workstation (SUN Clone)		$8.0
	Equipment Total	$0.0	$15.8

07/14/93

1995

Project Number: 95057
Project Title: Movement of Larval and Juvenile Fish
Agency: Institute of Marine Scie, UAF

FORM 2B
PROJECT
DETAIL

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

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

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$83.7	$146.3	$230.0	$0.0	
Travel	$0.0	$6.0	$12.0	$18.0	$0.0	
Contractual	$0.0	$0.0	$90.1	$90.1	$0.0	
Commodities	$0.0	$3.5	$10.0	$13.5	$0.0	
Equipment	$0.0	$4.0	$9.0	$13.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$97.2	$267.4	$364.6	$0.0	
General Administration	$0.0	$14.8	$32.3	$47.1	$0.0	
Project Total	$0.0	$112.0	$299.7	$411.7	$0.0	
Full-time Equivalents (FTE)	0.0	1.3	2.1	3.3	0.0	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost:
*Oct 1, 1994 - Jan 31, 1995
**Feb 1, 1995 - Sep 30, 1995

Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Lead Agency: US Forest Service/ADF&G-Habitat

1995

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FORM 2A
PROJECT
DETAIL

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

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

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$21.0	$35.0	$56.0		
Travel		$2.0	$4.0	$6.0		
Contractual		$0.0	$53.5	$53.5		
Commodities		$1.0	$2.0	$3.0		
Equipment		$0.0	$8.0	$8.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal		$24.0	$102.5	$126.5	$0.0	
General Administration		$3.2	$9.0	$12.2		
Project Total		$27.2	$111.5	$138.7	$0.0	
Full-time Equivalents (FTE)		0.3	0.4	0.7		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Reprt				
Intrm				
Natural Resource Manager II	3.0	$21.0	5.0	$35.0
Personnel Total	3.0	$21.0	5.0	$35.0

NEPA Cost:
*Oct 1, 1994 - Jan 31, 1995
**Feb 1, 1995 - Sep 30, 1995

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Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Reprt			
Intrm	Travel to PWS and GOA to survey and evaluate projects for habitat protection	$1.0	$2.0
	Per diem	$1.0	$2.0
	Travel Total	$2.0	$4.0
Contractual:			
Reprt			
Intrm			
	Printing/Map production		$50.0
	Aircraft charters		$2.0
	Training		$1.5
	Contractual Total	$0.0	$53.5

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Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Natural Resources

FORM 3B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Reprt		
Intrm		
Office supplies	$0.5	$1.0
Soft ware	$0.5	$1.0
Commodities Total	$1.0	$2.0
Equipment:		
Reprt		
Intrm		
Computer peripherals		$1.0
Computer		$7.0
Equipment Total	$0.0	$8.0

Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Natural Resources

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FORM 3B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Project Description

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

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

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost:
*Oct 1, 1994 - Jan 31, 1995
**Feb 1, 1995 - Sep 30, 1995

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Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Environmental Conservation

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

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

1995

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Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Environmental Conservation

FORM 3B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

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

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Project Number:95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Environmental Conservation

FORM 3B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

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

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$25.7	$38.3	$64.0		
Travel		$2.0	$4.0	$6.0		
Contractual		$0.0	$3.5	$3.5		
Commodities		$1.0	$2.0	$3.0		
Equipment		$1.0	$0.0	$1.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal		$29.7	$47.8	$77.5	$0.0	
General Administration		$3.9	$6.0	$9.9		
Project Total		$33.6	$53.8	$87.4	$0.0	
Full-time Equivalents (FTE)		0.3	0.5	0.8		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Reprt				
Intrm				
Habitat Biologist III	3.0	$18.7	5.0	$31.3
Program manager	1.0	$7.0	1.0	$7.0
Personnel Total	4.0	$25.7	6.0	$38.3

NEPA Cost:
*Oct 1, 1994 - Jan 31, 1995
**Feb 1, 1995 - Sep 30, 1995

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Project Number:95958
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Reprt		
Intrm		
Travel to PWS and GOA to survey and evaluate projects for habitat protection	$1.0	$2.0
Per diem	$1.0	$2.0
Travel Total	$2.0	$4.0
Contractual:		
Reprt		
Intrm		
Air charter		$2.0
Training		$1.5
Contractual Total	$0.0	$3.5

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Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Fish & Game

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

Commodities:	Reprt/Intrm	Remaining
Reprt		
Intrm		
office supplies	$0.5	$1.0
soft ware	$0.5	$1.0
Commodities Total	$1.0	$2.0
Equipment:		
Reprt		
Intrm		
hardware	$1.0	
Equipment Total	$1.0	$0.0

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Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: AK Dept. of Fish & Game

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

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

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$37.0	$73.0	$110.0		
Travel		$2.0	$4.0	$6.0		
Contractual		$0.0	$33.1	$33.1		
Commodities		$1.5	$6.0	$7.5		
Equipment		$3.0	$1.0	$4.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal		$43.5	$117.1	$160.6	$0.0	
General Administration		$5.5	$13.3	$18.8		
Project Total		$49.0	$130.4	$179.4	$0.0	
Full-time Equivalents (FTE)		0.7	1.2	1.8		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Reprt				
Intrm				
Program manager	1.0	$6.0	1.0	$6.0
Habitat Biologist	3.0	$15.0	5.0	$35.0
Clerk	4.0	$16.0	8.0	$32.0
Personnel Total	8.0	$37.0	14.0	$73.0

NEPA Cost:
*Oct 1, 1994 - Jan 31, 1995
**Feb 1, 1995 - Sep 30, 1995

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Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: Dept. of Agriculture, Forest Service

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

	Reprt/Intrm	Remaining
Travel:		
Reprt		
Intrm		
Travel to PWS and the GOA to evaluate projects for habitat protection	$1.0	$2.0
Per diem	$1.0	$2.0
Travel Total	$2.0	$4.0
Contractual:		
Reprt		
Intrm		
air charter		$10.0
helo charters		$7.2
boat charters		$14.4
Training		$1.5
Contractual Total	$0.0	$33.1

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Project Number: 95058
Project Title:Restoration Assistance to Private Landowners
Agency: Dept. of Agriculture, Forest Service

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

	Reprt/Intrm	Remaining
Commodities:		
Reprt		
Intrm		
soft ware	$0.5	$1.0
Office supplies	$0.5	$4.0
phone/fax	$0.5	$1.0
Commodities Total	$1.5	$6.0
Equipment:		
Reprt		
Intrm		
Computer	$3.0	$1.0
Equipment Total	$3.0	$1.0

1995

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Project Number: 95058
Project Title:Restoration Assistance to Private Landowners
Agency: Dept. of Agriculture, Forest Service

FORM 3B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

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

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

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

NEPA Cost:
*Oct 1, 1994 - Jan 31, 1995
**Feb 1, 1995 - Sep 30, 1995

Project Number: 95058
Project Title:Restoration Assistance to Private Landowners
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Reprt		
Intrm		
Travel to PWS and the GOA to evaluate projects for habitat protection		
Perdiem		
Travel Total	$0.0	$0.0
Contractual:		
Reprt		
Intrm		
air charter		
Training		
Contractual Total	$0.0	$0.0

1995

Project Number:95058
Project Title:Restoration Assistance to Private Landowners
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Reprt		
Intrm		
software		
Office supplies		
Commodities Total	$0.0	$0.0
Equipment:		
Reprt		
Intrm		
Equipment Total	$0.0	$0.0

1995

Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

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

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

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost:
*Oct 1, 1994 - Jan 31, 1995
**Feb 1, 1995 - Sep 30, 1995

1995

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Project Number: 95058
Project Title:Restoration Assistance to Private Landowners
Agency: Dept. of Interior, National Park Service

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

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

Project Number:95058
Project Title:Restoration Assistance to Private Landowners
Agency: Dept. of Interior, National Park Service

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

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

1995

Project Number: 95058
Project Title: Restoration Assistance to Private Landowners
Agency: Dept. of Interior, National Park Service

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: This project will provide information describing the geographic extent of spruce bark beetle infestation within the range of habitats previously demonstrated to be important to EVOS species. The project will identify specific critical habitats for each applicable injured specie and evaluate impacts to these critical habitats resulting from spruce bark beetle infestations.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
						95 Report
Personnel	$0.0	$0.0	$119.8	$119.8	$29.2	$29.2
Travel	$0.0	$0.0	$7.8	$7.8	$0.0	$0.0
Contractual	$0.0	$0.0	$47.1	$47.1	$13.3	$13.3
Commodities	$0.0	$0.0	$5.7	$5.7	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$180.4	$180.4	$42.5	$42.5
General Administration	$0.0	$0.0	$21.3	$21.3	$5.3	$5.3
Project Total	$0.0	$0.0	$201.7	$201.7	$47.8	$47.8
Full-time Equivalents (FTE)		0.0	2.1	2.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rem Habitat Biologist III			2.0	$11.8
Habitat Biologist II			12.0	$57.6
FWT III			4.0	$13.6
Cartographer II			2.0	$10.8
Librarian II			4.0	$20.0
Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	25.0	$119.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95060
Project Title: Spruce Bark Beetle Infestation Impacts on Injured Fish
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm			
Rem	16 RT Anchorage-Homer @ $150/RT + 2 days per diem @ $150/day	$0.0	$2.7
	8 RT Anchorage-Cordova @ $200/Rt	$0.0	$1.6
	6 RT Anchorage-Kodiak @ $250/RT	$0.0	$1.5
	20 RT Anchorage-Kenai @ $100/RT	$0.0	$2.0
	Travel Total	$0.0	$7.8
Contractual:			
Rept			
Intrm			
Rem	Air charter (Cessna) 20 hrs @ $250/hr	$0.0	$5.0
	Air charter (Beaver) 20 hrs @ $320/hr	$0.0	$6.4
	Helicopter charter-40 hrs @ $600/hr	$0.0	$24.0
	Library services	$0.0	$0.5
	Office services (long distance charges, copier service)	$0.0	$1.2
	Public education video production	$0.0	$10.0
	Contractual Total	$0.0	$47.1

Project Number: 95060
Project Title: Spruce Bark Beetle Infestation Impacts on Injured Fish
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm			
Rem	Office supplies (paper, copier toner, pens)	$0.0	$1.0
	ARC-CAD GIS software	$0.0	$4.0
	ARCVIEW GIS software	$0.0	$0.5
	Internet access software	$0.0	$0.2
	Commodities Total	$0.0	$5.7
Equipment:		$0.0	$0.0
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

Project Number: 95060
Project Title: Spruce Bark Beetle Infestation Impacts on Injured Fish
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Determine the annual level of latrine site use by river otters in the northern Knight Island study area and monitor the annual harvest with emphasis on harvest size and the presence or absence of subadult animals from the area impacted by the EVOS. This study will provide the population monitoring information needed to achieve the restoration objective of relying on natural recovery.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel		$0.0	$4.2	$4.2	$0.0
Travel		$0.0	$0.0	$0.0	$0.0
Contractual		$0.0	$65.0	$65.0	$0.0
Commodities		$0.0	$0.0	$0.0	$0.0
Equipment		$0.0	$0.0	$0.0	$0.0
Capital Outlay		$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$69.2	$69.2	$0.0
General Administration		$0.0	$5.2	$5.2	$0.0
Project Total	$0.0	$0.0	$74.4	$74.4	$0.0
Full-time Equivalents (FTE)		0.0	0.1	0.1	
	Dollar amounts are shown in thousands of dollars.				

Comment

NOTE: This project will only be conducted only during 1995.

The report budget for FFY95 will be a condition of the contract for this project.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Rem Program Manager			0.8	$4.2
Personnel Total	0.0	$0.0	0.8	$4.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95062
Project Title: River Otter Recovery Monitoring
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm		$0.0	$0.0
	Travel Total	$0.0	$0.0
Contractual:			
Rept			
Intrm			
Rem	Contract to determine the annual level of latrine site use by otters; monitor the annual harvest of otters with emphasis on harvest size and the presence or absence of subadult animals from the area impacted by the EVOS.		$65.0
	Contractual Total	$0.0	$65.0

07/14/93

Project Number: 95062
Project Title: River Otter Recovery Monitoring
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

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

07/14/93

1995

Printed: 9/12/94 11:48 AM

Project Number: 95062
Project Title: River Otter Recovery Monitoring
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will monitor the abundance of harbor seals at 23 trend count sites in PWS; characterize habitat use, hauling out, and diving behavior so that important habitat can be properly managed; investigate diet and trophic interactions to better understand whether limited food resources are inhibiting recovery; model the effects of killer whale predation, the subsistence harvest, and incidental take by fisheries on the population; and investigate the disease and genetic stock structure. Aerial surveys will be conducted during pupping and molting periods and data will be used to determine whether harbor seals in PWS are recovering from the EVOS. Satellite-linked transmitters will be attached to 12 harbor seals per year to obtain information on movements, use of haulouts, and diving behavior. Seals caught during tagging will be sampled for blood chemistry, disease assays, lipid analysis, genetics, and stable isotope analyses.

Budget Category:	1994 Project No. 94064 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	96 Field	95 Report
Personnel	$98.6	$76.9	$48.5	$125.4	$121.7	$76.9	$42.5	$79.2
Travel	$11.6	$4.0	$7.7	$11.7	$11.7	$4.0	$7.6	$4.1
Contractual	$82.7	$17.0	$106.1	$123.1	$119.1	$17.0	$106.1	$13.0
Commodities	$56.7	$2.7	$55.4	$58.1	$57.9	$2.7	$55.4	$2.5
Equipment	$0.0	$1.4	$0.0	$1.4	$1.4	$1.4	$0.0	$1.4
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$249.6	$102.0	$217.7	$319.7	$311.8	$102.0	$211.6	$100.2
General Administration	$20.6	$12.7	$14.7	$27.4	$26.6	$12.7	$13.8	$12.8
Project Total	$270.2	$114.7	$232.4	$347.1	$338.4	$114.7	$225.4	$113.0
Full-time Equivalents (FTE)	1.5	1.1	0.7	1.8				

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Wildlife Biologist III	6.0	$37.8	4.0	$25.2
	Wildlife Biologist III	1.5	$9.8	1.0	$6.5
	Analyst Programmer III	1.5	$7.7	1.0	$5.1
	Biometrician II	1.0	$5.7	1.0	$5.7
	Fish and Wildlife Technician IV	3.0	$11.7	0.0	$0.0
	Program Manager	0.8	$4.2	1.0	$6.0
	Personnel Total	13.8	$76.9	8.0	$48.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

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Project Number: 95064
Project Title: Monitoring, Habitat Use and Trophic Interactions of Harbor Seals in Prince William Sound, Alaska
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	3 RT Fairbanks/Anchorage @ $0.4 + 3 days per diem	$1.6	
	1 RT Fairbanks/Cordova @ $0.6 + 2 days per diem	$0.9	
	1 RT Fairbanks/Seattle @ $0.9 + 4 days per diem	$1.5	
Rem	4 RT personal vehicle Fairbanks/Portage @ $0.33		$1.3
	4 RT vehicle + boats on Portage-Whittier train @ $0.4		$1.6
	2 RT Fairbanks/Cordova @ $0.6		$1.2
	Per diem for 2 people for 2 weeks for field work		$3.6
	Travel Total	$4.0	$7.7
Contractual:			
Rept	ARGOS - FFY94 obligation	$14.0	$0.0
	Print/graphics	$0.9	$0.0
	Long distance phone charges/postage	$0.9	$0.0
	Software maintenance	$1.2	$0.0
Rem	Aircraft chrter 60 hours @ $0.22	$0.0	$13.0
	Data acquisition time for ARGOS @ $4.0/ppt year for 3.23 ppt years	$0.0	$13.0
	Vessel charter for tagging and sampling @ $1.5/day for 16 days	$0.0	$24.0
	Lipid analysis contract	$0.0	$30.0
	Demographic modeling by NMML/NMFS	$0.0	$15.0
	Genetic analysis contract	$0.0	$5.0
	Laboratory analysis contract for blood and disease samples	$0.0	$5.0
	Freight and shipping of samples	$0.0	$0.6
	Long distance phone charges	$0.0	$0.5
	Contractual Total	$17.0	$106.1

Project Number: 95064
Project Title: Monitoring, Habitat Use and Trophic Interactions of Harbor Seals in Prince William Sound, Alaska
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Office supplies	$0.5	$0.0
	Computer supplies	$0.6	$0.0
	Computer software for graphics, GIS, and other analyses	$1.6	$0.0
Rem	12 PPT's @ $4.0/PPT	$0.0	$48.0
	Film	$0.0	$0.4
	Fuel for skiffs and research vessel	$0.0	$3.0
	Repair supplies for skiffs, nets, etc.	$0.0	$2.0
	Field supplies for tagging and other sampling	$0.0	$2.0
	Commodities Total	$2.7	$55.4
Equipment:			
Rept	Computer memory for GIS computer	$1.2	$0.0
	Modem for access to Service ARGOS and E-Mail	$0.2	$0.0
	Equipment Total	$1.4	$0.0

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Project Number: 95064
Project Title: Monitoring, Habitat Use and Trophic Interactions of Harbor Seals in Prince William Sound, Alaska
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: Since the EVOS, PWSAC has observed unusual mortality in second and third generation of the odd year cycle pink salmon that returned through oil in 1989. This project is designed to determine the cause of mortality and provide recommendations for reducing mortality and restoring the pink salmon production to its pre-spill condition.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$3.0	$3.0	$3.0	Reports will be complete within the FFY and will be a condition of the contract. Budgets for FFY95 and FFY96 include the cost for report writing.
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$52.5	$52.5	$53.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$55.5	$55.5	$56.0	
General Administration	$0.0	$0.0	$4.1	$4.1	$4.2	
Project Total	$0.0	$0.0	$59.6	$59.6	$60.2	
Full-time Equivalents (FTE)		0.0	0.0	0.0		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm	0.0	$0.0	0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95065
Project Title: PWSAC Pink Salmon Fry Mortality
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

			Reprt/Intrm	Remaining
Travel:				
Rept			$0.0	$0.0
Intrm				
		Travel Total	$0.0	$0.0
Contractual:				
Contract with PWSAC to investigate the cause of the mortality at their hatcheries in PWS.			$0.0	$52.5
Line item breakout of this contract is as follows:				
	100	$2.0		
	200	$2.0		
	300	$46.0 Subcontract to do histopathology on 400 pink salmon fry @ $80/fry,		
	400	$0.0 100 adult pink salmon @ $100/adult, and 100 eggs @ $40/egg		
	500	$0.0		
Subtotal		$50.0		
PWSAC GA.		$2.5		
Contract Total		$52.5		
		Contractual Total	$0.0	$52.5

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

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

07/14/93

1995

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Project Number: 95065
Project Title: PWSAC Pink Salmon Fry Mortality
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Restoration of Salmon Stocks of Special Importance to Native Cultures - This project will restore and enhance salmon stocks identified by Native users as depressed and of value to their subsistence life style. Assess appropriate restoration/ enhancement techniques for up to eight streams/stocks. Begin NEPA process for those streams with known appropriate techniques. Contracts will be awarded for appropriate restoration/enhancement activities on candidate streams. The restoration options include installation of egg incubation boxes, fish barrier bypasses, construction of spawning channels, incubation of eggs and early juvenile rearing at hatcheries with planting of juveniles in the stream of origin, capture of emergent fry at streams and short-term rearing in netpens off the stream mouths.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$10.2	$66.3	$76.5	$0.0	
Travel	$0.0	$1.3	$13.3	$14.6	$0.0	FY96 budget request not available at this time.
Contractual	$0.0	$1.5	$248.5	$250.0	$0.0	
Commodities	$0.0	$0.0	$5.0	$5.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$13.0	$333.1	$346.1	$0.0	
General Administration	$0.0	$1.6	$27.3	$29.0	$0.0	
Project Total	$0.0	$14.6	$360.4	$375.1	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0		

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: $32.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

Printed: 9/12/94 11:50 AM

Project Number: 95069

Project Title: Restoration of Salmon Stocks of Special Importance to Native Cultures

Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Restoration of Salmon Stocks of Special Importance to Native Cultures - This project will restore and enhance salmon stocks identified by Native users as depressed and of value to their subsistence life style. Assess appropriate restoration/ enhancement techniques for up to eight streams/stocks. Begin NEPA process for those streams with known appropriate techniques. Contracts will be awarded for appropriate restoration/enhancement activities on candidate streams. The restoration options include installation of egg incubation boxes, fish barrier bypasses, construction of spawning channels, incubation of eggs and early juvenile rearing at hatcheries with planting of juveniles in the stream of origin, capture of emergent fry at streams and short-term rearing in netpens off the stream mouths.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$10.2	$52.2	$62.4	$0.0	
Travel	$0.0	$1.3	$1.3	$2.6	$0.0	FY96 budget request not available at this time.
Contractual	$0.0	$1.5	$246.5	$248.0	$0.0	
Commodities	$0.0	$0.0	$5.0	$5.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$13.0	$305.0	$318.0	$0.0	
General Administration	$0.0	$1.6	$25.1	$26.7	$0.0	
Project Total	$0.0	$14.6	$330.1	$344.7	$0.0	
Full-time Equivalents (FTE)	0.0	0.2	1.1	1.3	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm	Fishery Biologist II	2.0	$9.0	6.0	$27.0
	Fishery Technician II	0.0	$0.0	6.0	$19.2
	Program Manager	0.3	$1.2	1.0	$6.0
	Personnel Total	2.3	$10.2	13.0	$52.2

NEPA Cost: $16.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95069

Project Title: Restoration of Salmon Stocks of Special Importance to Native Cultures

Agency: AK Dept. of F & Game

FORM 3A SUB-PROJECT

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	2 RT - Anchorage-Cordova to attend restoration planning meetings @ $200/RT + 7 days per diem @ $150/day	$0.7	$0.7
	2 RT - Anchorage-Cordova to attend regional planning team meetings @ $200/RT + 5 days per diem @ $150/day	$0.6	$0.6
	Travel Total	$1.3	$1.3
Contractual:			
Rept			
Intrm			
Intrm	Air charter - 6 RT Anchorage-Chenega & Tatitlek @ $0.5 for project selection by native users	$1.5	$1.5
	Air charter - 10 RT to selected project sites @ $1.0/trip	$0.0	$10.0
	Contract for engineering design for selected projects	$0.0	$15.0
	Contract for stream/stock restoration projects at sites selected by Native users	$0.0	$220.0
	Contractual Total	$1.5	$246.5

Project Number: 95069
Project Title: Restoration of Salmon Stocks of Special Importance to Native Cultures
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Field survey supplies (food, outboard motor fuel & oil, camping supplies)	$0.0	$5.0
Rem			
	Commodities Total	$0.0	$5.0
Equipment:			
Rept			
Intrm		$0.0	$0.0
Rem			
	Equipment Total	$0.0	$0.0

07/14/93

Project Number: 95069
Project Title: Restoration of Salmon Stocks of Special Importance to Native Cultures
Agency: AK Dept. of Fi[illegible] Game

FORM 3B
SUB-PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Restoration of Salmon Stocks of Special Importance to Native Cultures - This project will restore and enhance salmon stocks identified by Native users as depressed and of value to their subsistence life style. Assess appropriate restoration/ enhancement techniques for up to eight streams/stocks. Begin NEPA process for those streams with known appropriate techniques. Contracts will be awarded for appropriate restoration/enhancement activities on candidate streams. The restoration options include installation of egg incubation boxes, fish barrier bypasses, construction of spawning channels, incubation of eggs and early juvenile rearing at hatcheries with planting of juveniles in the stream of origin, capture of emergent fry at streams and short-term rearing in netpens off the stream mouths.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$14.1	$14.1	$0.0	
Travel	$0.0	$0.0	$12.0	$12.0	$0.0	
Contractual	$0.0	$0.0	$2.0	$2.0	$0.0	FY96 budget request not available at this time.
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$28.1	$28.1	$0.0	
General Administration	$0.0	$0.0	$2.3	$2.3	$0.0	
Project Total	$0.0	$0.0	$30.4	$30.4	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.3	0.3	1.1	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intm Fisheries Biologist GS-11	0.0	$0.0	1.5	$6.6
Biologist GS-09	0.0	$0.0	2.0	$7.5
Personnel Total	0.0	$0.0	3.5	$14.1

NEPA Cost: $16.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95069

Project Title: Restoration of Salmon Stocks of Special Importance to Native Cultures

Agency: U.S. Dept of Agriculture - Forest Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Air charter, per diem	$0.0	$12.0
Rem			
	Travel Total	$0.0	$12.0
Contractual:			
Rept	Vessel charter - 2 days @ $1.0/day	$0.0	$2.0
Intrm			
Rem			
	Contractual Total	$0.0	$2.0

07/14/93

Project Number: 95069
Project Title: Restoration of Salmon Stocks of Special Importance to Native Cultures
Agency: U.S. Dept of Agriculture - Forest Service

FORM 3B
SUB-PROJECT
DETAIL

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

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

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1995

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Project Number: 95069
Project Title: Restoration of Salmon Stocks of Special Importance to Native Cultures
Agency: U.S. Dept of Agriculture - Forest Service

FORM 3B
SUB-PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Herring Reproductive Impairment - The primary goal of this project is to determine if herring reproduction can be impaired by exposue to oil; a combination of controlled laboratory exposures and viability measurements from herring in the field will be used. In one year (FY 94), the goal was to determine if exposure of pre-spawning adults to oil would result in genetically impaired larvae with reduced survival potential. In FY 95, the laboratory oil exposures will be extended to eggs and larvae, with similar measurements of genetically impaired larvae. This will allow direct comparison of impacts between adult, egg, and larval stages. Data will be used to infer what the relative effects the Exxon Valdez oil spill were on adult and early life stages of herring in Prince William Sound.

Budget Category:	1994 Project No. 94166 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$92.6	$120.3	$122.9	$243.2	$96.7	
Travel	$3.1	$2.0	$18.5	$20.5	$4.0	
Contractual	$50.0	$0.0	$64.0	$64.0	$0.0	
Commodities	$23.8	$8.5	$25.0	$33.5	$4.0	
Equipment	$0.0	$0.0	$5.0	$5.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$169.5	$130.8	$235.4	$366.2	$104.7	
General Administration	$17.4	$18.0	$22.9	$40.9	$14.5	
Project Total	$186.9	$148.8	$258.3	$407.1	$119.2	
Full-time Equivalents (FTE)	1.8	2.2	2.4	4.6	2.5	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project Leader GS - 12	6.0	$35.1	5.0	$29.1
Chemist GS - 11	7.0	$34.7	5.0	$24.8
Chemist GS - 9	7.0	$28.7	5.0	$20.6
Zoologist GS - 7	6.0	$17.4	5.0	$15.8
Physiologist GS - 12	0.0	$0.0	3.5	$20.7
Biol. Technician GS - 5	0.0	$0.0	4.5	$11.4
Program Manager	0.9	$4.4	0.6	$0.5
Personnel Total	26.9	$120.3	28.6	$122.9

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95074
Project Title: Herring Reproductive Impairment
Agency: National Oceanic & Atmospheric Admin

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	4 roundtrip Juneau to Anchorage, workshop, meetings for P.I., staff	$2.0	$2.5
Rem	Airfare $450; perdiem 12d @ $225		
	11 roundtrips to Prince William Sound for field sampling		$10.9
	Airfare $352; perdiem 40d @ $175		
	6 roundtrip to Sitka for control field sampling		$5.1
	Airfare $162; per diem 24 d @ $175		
	Travel Total	$2.0	$18.5
Contractual:			
Rept	Purse seine contract to collect adult herring for oil exposure to eggs and larvae		$10.0
Rem	Genetic analyses contract for possible genetic injury to larval herring		
	1,500 larvae @ $20/larvae		$30.0
	Histopathological evaluation of oil-exposed larvae		$6.0
	86 larvae @ $70/larvae		
	Maintenance contract for gas chromatograph/mass spectrometer		$12.0
	Data entry contract		$4.0
	Repair contract for compound microscopes, osmometer, etc.		$2.0
	Contractual Total	$0.0	$64.0

Project Number: 95074
Project Title: Herring Reproductive Impairment
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Wet lab supplies and exposure apparatus	$2.5	$6.0
Office suplies - consumables	$0.5	$0.5
Chemistry lab supplies	$2.0	$6.5
Consumables, glassware, detergent, first aid supplies, protective eye wear, etc.		
Culturing supplies	$1.5	$3.0
Media, glassware, tubing, etc.		
Field supplies, gear	$1.5	$4.0
Nets, float coats, buckets, sample jars, etc.		
Dissecting equipment	$0.0	$3.0
All < $500: scissors, scalpels, slides, trays, etc.		
Film, photography supplies	$0.5	$2.0
Commodities Total	$8.5	$25.0
Equipment:		
Micro Balance		$5.0
Equipment Total	$0.0	$5.0

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Printed: 9/12/94 11:51 AM

Project Number: 95074
Project Title: Herring Reproductive Impairment
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Population structure of Blue Mussels in relation to levels of oiling and densities of vertibrate predators.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$94.0	$94.0	$94.0	
Travel	$0.0	$0.0	$20.0	$20.0	$4.0	
Contractual	$0.0	$0.0	$48.0	$48.0	$0.0	
Commodities	$0.0	$0.0	$18.0	$18.0	$4.5	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$180.0	$180.0	$102.5	
General Administration	$0.0	$0.0	$17.5	$17.5	$14.1	
Project Total	$0.0	$0.0	$197.5	$197.5	$116.6	
Full-time Equivalents (FTE)		0.0	1.5	1.5		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Leader GS12	0.0	$0.0	3.0	$20.9
Fish Biologist GS9	0.0	$0.0	5.0	$20.5
Fish Biologist GS9	0.0	$0.0	4.0	$18.7
Chemist GS9	0.0	$0.0	5.0	$28.9
Program Manager GS12	0.0	$0.0	1.0	$5.0
Personnel Total	0.0	$0.0	18.0	$94.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95075
Project Title: Blue Mussel Population Structure
Agency: National Oceanic & Atmospheric Admin

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
4 RT Juneau to Anchorage for meetings with other P.I.s & coordination Airfare $450; total 20 days per diem @ $225 per day	$0.0	$6.3
15 RT Juneau to Seward & PWS for field work Airfare $544	$0.0	$13.7
Travel Total	$0.0	$20.0
Contractual:		
Vessel Charter for field work in PWS 3 trips, 10 days each @ $1600 per day	$0.0	$48.0
Contractual Total	$0.0	$48.0

07/14/93

Project Number: 95075
Project Title: Blue Mussel Population Structure
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Chemistry laboratory supplies Consumables, glassware, repair parts, protective devices, etc.	$0.0	$5.0
Office supplies (consumable), software upgrades	$0.0	$0.9
Fuel for charter vessel	$0.0	$3.2
Field Gear Rain gear, float coats, worksuits	$0.0	$2.5
Field Supplies Jars, sampling equipment ($500 @), dissecting tools, glue, chemical dyes, etc.	$0.0	$6.0
Sample processing supplies Consumables, slides, slide boxes, cutting/grinding tools, digital calipers	$0.0	$0.4
Commodities Total	$0.0	$18.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95075
Project Title: Blue Mussel Population Structure
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Effects of oiled incubation substrate on survival and straying of Wild Pink Salmon

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$76.1	$76.1	$85.6	
Travel	$0.0	$0.0	$5.8	$5.8	$4.0	
Contractual	$0.0	$0.0	$5.8	$5.8	$0.0	
Commodities	$0.0	$0.0	$56.4	$56.4	$5.6	
Equipment	$0.0	$0.0	$24.0	$24.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$168.1	$168.1	$95.2	
General Administration	$0.0	$0.0	$11.8	$11.8	$12.8	
Project Total	$0.0	$0.0	$179.9	$179.9	$108.0	
Full-time Equivalents (FTE)		0.0	1.3	1.3		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project Leader GS13	0.0	$0.0	2.0	$14.0
Co-Leader GS11	0.0	$0.0	4.5	$22.2
Fish Biologist GS11	0.0	$0.0	3.0	$14.3
Fish Biologist GS9	0.0	$0.0	5.0	$20.6
Program Manager GS12	0.0	$0.0	1.0	$5.0
Personnel Total	0.0	$0.0	15.5	$76.1

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95076
Project Title: Effects of Oiled Substrate on Wild Pink Salmon
Agency: National Oceanic & Atmospheric Admin

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Field trips to Little Port Walter 6 trips ; airfare $800	$0.0	$5.8
Travel Total	$0.0	$5.8
Contractual:		
Repairs to gas chromatographic and other chem lab equipment	$0.0	$5.8
Contractual Total	$0.0	$5.8

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1995

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Project Number: 95076
Project Title: Effects of Oiled Substrate on Wild Pink Salmon
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Chemistry lab supplies	$0.0	$5.8
(Consumables, glassware, solvents, reagents, protective clothing, etc.)	$0.0	$8.5
Apparatus building materials, incubation containers	$0.0	$16.5
Groceries for field staff	$0.0	$0.8
Office supplies (consumables), film	$0.0	$1.2
Fuel	$0.0	$2.0
Coded Wire Tags and processing tools	$0.0	$12.2
Field Supplies, gear	$0.0	$9.4
Shovels, float costs, rain gear, buckets		
Commodities Total	$0.0	$56.4
Equipment:		
Coded wire tagger, power supply, quality control detector	$0.0	$13.8
Outboard moter	$0.0	$3.0
Chillers for temperature control plus regulators 6@ $1200	$0.0	$7.2
Equipment Total	$0.0	$24.0

Project Number: 95076
Project Title: Effects of Oiled Substrate on Wild Pink Salmon
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

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

Project Description: This study proposes to revisit the original Coastal Habitat Injury Assessment (CHIA) study sites in order to asses the recovery rates of intertidal invertebrates and algae. The second component in this proposal is to validate the after, control-impact pairs (ACIP) design employed by the CHIA study. Matched sets of non-oiled sites will be selected using criteria established for the CHIA project. These sites will be monitored and evaluated using the same procedures used by the CHIA study.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 95 Rept	Comment 96 Field
Personnel	$0.0	$0.0	$6.0	$6.0	$14.4	$4.2	$10.2
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$916.4	$916.4	$1,384.5	$260.8	$1,123.7
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$922.4	$922.4	$1,398.9	$264.9	$1,133.9
General Administration	$0.0	$0.0	$31.7	$31.7	$54.7	$18.1	$36.6
Project Total	$0.0	$0.0	$954.1	$954.1	$1,453.6	$283.0	$1,170.5
Full-time Equivalents (FTE)		0.0	0.1	0.1			
	Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	1.0	$6.0
	0.0	$0.0	0.0	$0.0
	0.0	$0.0	0.0	$0.0
	0.0	$0.0	0.0	$0.0
	0.0	$0.0	0.0	$0.0
	0.0	$0.0	0.0	$0.0
	0.0	$0.0	0.0	$0.0
	0.0	$0.0	0.0	$0.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost:	$0.0
*Oct 1, 1994 - Dec 31, 1994	
**Jan 1, 1995 - Sep 30, 1995	

06/01/94

1995

Printed: 9/12/94 11:52 AM

Project Number: 95086-A
Project Title: Coastal Habitat Intertidal Monitoring and Experimental Design Verification
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rep		$0.0	$0.0
Intm			
	Travel Total	$0.0	$0.0
Contractual:			
Rept			
Intrm			
Rem	RSA with University of Alaska, Fairbanks to revisit the original Coastal Habitat Injury Assessment study sites to assess the recovery rates of intertidal invertebrates and algae. Includes contracts with WEST, Inc. and Coastal Resources Associates for site verification studies.	$0.0	$916.4
	RSA line item breakout is as follows:		
	100 $407.5		
	200 $27.1		
	300 $275.9		
	400 $10.6		
	500 $39.0		
	Subtotal $760.1		
	UAF General Admin $156.3		
	RSA Total $916.4		
	Contractual Total	$0.0	$916.4

Project Number: 95086-A
Project Title: Coastal Habitat Intertidal Monitoring and Experimental Design Verification
Agency: AK Dept. of Fi[illegible] & Game

FORM 2A
PROJECT
DETAIL

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

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

07/14/93

1995

Printed: 9/12/94 11:52 AM

Project Number: 95086-A
Project Title: Coastal Habitat Intertidal Monitoring and Experimental Design Verification
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: This project examines the factors that may inhibit the recovery of subtidal populations of eelgrass and invertebrates within the eelgrass community. This would lead to the determination of the necessity for, and appropriate design of, restoration activities. This project will allow a determination of whether eelgrass resources should be restored, and if so, what methods may be appropriate for restoration.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 96 Field	Comment 95 Report
Personnel	$0.0	$0.0	$6.0	$6.0	$10.2	$6.0	$4.2
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$92.9	$92.9	$128.2	$88.1	$40.1
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$98.9	$98.9	$138.4	$92.2	$44.2
General Administration	$0.0	$0.0	$7.4	$7.4	$10.5	$7.1	$3.4
Project Total	$0.0	$0.0	$106.3	$106.3	$148.9	$99.0	$47.6
Full-time Equivalents (FTE)		0.0	0.1	0.1			
	Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Rem Program Manager	0.0	$0.0	1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95086-B
Project Title: Population Dynamics of Eelgrass and Associated Fauna
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept	$0.0	$0.0
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
RSA with University of Alaska, Fairbanks to determine the necessity for, and appropriate design of restoration activities for eelgrass resources. Includes subcontract with Coastal Resources Associates for field support on eelgrass restoration studies.	$0.0	$92.9
RSA line item breakout is as follows:		
100 $30.3		
200 $8.2		
300 $28.5		
400 $8.5		
500 $4.0		
Subtotal $79.5		
UAF General Admin $13.4		
RSA Total $92.9		
Contractual Total	$0.0	$92.9

Project Number: 95086-B
Project Title: Population Dynamics of Eelgrass and Associated Fauna
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

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

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1995

Printed: 9/12/94 11:53 AM

Project Number: 95086-B
Project Title: Population Dynamics of Eelgrass and Associated Fauna
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: 1995 Herring Bay Monitoring and Experimental Study- This is a continuation of a long term intertidal study in Herring Bay to understand the factors that limit and/or facilitate recolonization of intertidal invertebrates and intertidal algae. This study will continue to provide long term intertidal data.

Budget Category:	1994 Project No. 94086 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$278.5	$0.0	$9.0	$9.0	$9.0	
Travel	$18.9	$0.0	$0.0	$0.0	$0.0	
Contractual	$104.1	$308.6	$555.4	$864.0	$751.9	
Commodities	$10.9	$0.0	$0.0	$0.0	$0.0	
Equipment	$5.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$417.4	$308.6	$564.4	$873.0	$760.9	
General Administration	$83.6	$18.7	$12.5	$31.2	$28.9	
Project Total	$501.0	$327.3	$576.9	$904.2	$789.8	
Full-time Equivalents (FTE)		4.9	6.0	10.9		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Rem Program Manager	0.0	$0.0	1.5	$9.0
Personnel Total	0.0	$0.0	1.5	$9.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept	$0.0	$0.0
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
RSA with University of Alaska, Fairbanks to conduct studies of the factors that limit and/or facilitate recolonization of intertidal invertebrates and intertidal algae. Includes contract with Coastal Resources for consulting on the final report and for SOP preparation for the 1995 field season. See pages 3 through 9 for RSA/Coastal Resources budget detail.	$308.6	$555.4
Contractual Total	$308.6	$555.4

Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

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

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Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: 1995 Herring Bay Monitoring and Experimental Study- This is a continuation of a long term intertidal study in Herring Bay to understand the factors that limit and/or facilitate recolonization of intertidal invertebrates and intertidal algae. This study will continue to provide long term intertidal data.

Budget Category:	1994 Project No. 94086 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	Comment 95 Report
Personnel	$278.5	$222.4	$269.2	$491.6	$383.1	$222.4	$113.9
Travel	$18.9	$7.2	$27.4	$34.6	$31.6	$7.2	$4.2
Contractual	$104.1	$22.8	$148.7	$171.5	$166.5	$22.8	$17.8
Commodities	$10.9	$4.8	$11.7	$16.5	$13.7	$4.8	$2.0
Equipment	$5.0	$0.0	$5.8	$5.8	$5.8	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$417.4	$257.2	$462.8	$720.0	$600.7	$257.2	$137.9
General Administration	$83.6	$51.4	$92.6	$144.0	$120.1	$51.4	$27.6
Project Total	$501.0	$308.6	$555.4	$864.0	$720.8	$308.6	$165.5
Full-time Equivalents (FTE)		4.9	6.0	11.0			

Dollar amounts are shown in thousands of dollars.

	Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	PI- Highsmith	2.0	$22.6	1.5	$16.3
Rept	PI- Stekoll	3.0	$24.5	2.0	$18.5
Rept	PI- Johnson	2.0	$15.1	0.0	$0.0
Rept	UAF project manager/Research Assoc.	7.0	$29.3	10.0	$49.4
Rept	Technician/crew leader	4.0	$18.6	4.0	$19.8
Rept	Technicians-invertebrate & Fish (4 & 2)	15.0	$60.7	16.0	$67.6
Rept	Technician - Algae (2)	14.0	$36.2	15.0	$65.1
Rept	Graduate Students (2) + tuition	12.0	$15.4	24.0	$32.5
	Personnel Total	59.0	$222.4	72.5	$269.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Sub-Project: Fucus Monitoring/Experimental Study
Agency: University of [illegible]ka - Fairbanks

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	Round trip - Fairbanks/Anchorage to consult with project personnel on data analysis and for final report preparation, and to discuss and prepare study plan for the 1995 field season	$1.3	$4.0
Rept	Round trip - Juneau/Anchorage to consult with project personnel on data analysis and for final report preparation and to discuss and prepare study plan for the 1995 field season	$1.4	$4.4
Rept	Round trip - Juneau/Fairbanks to consult with project personnel for preliminary synthesis of data cluster analysis, and data interpretations for final report.	$1.7	$0.0
	Round trip - Fairbanks/Seward, travel for technicians to and from Seward for field work (16 trips)	$0.0	$8.3
	Round trip - Juneau/Seward, travel for technicians to and from Seward for field work (15 trips)	$0.0	$9.0
Rept	Round trip - Juneau/Calif, travel for algae personnel to consult with CRA subcontractors in California to discuss data analysis, report writing, and the 1995 study plan.	$2.8	$1.7
	Travel Total	$7.2	$27.4
Contractual:			
	Vessel charter w/fuel for field work approximately 100 days @ $1.1/day	$0.0	$112.5
	Air taxi support 10 hours @ $200/hour	$0.0	$2.0
	Coastal Resources Associates subcontract for Fucus Monitoring Study	$0.0	$17.1
Rpt	Coastal Resources Associates subcontract for Fucus Experimental Study	$15.5	$8.5
	DNR GIS support	$0.0	$1.5
	Seward Marine Center cost	$0.0	$1.1
	Freight/Shipping	$0.0	$1.5
Rpt	Warehouse/storage	$2.5	$2.0
Rpt	Publications/printing	$2.0	$1.0
Rpt	Long distance phone charges/FAX/Xerox	$1.5	$1.3
Rpt	Data management/computer maintenance/literature search	$1.3	$0.2
	Contractual Total	$22.8	$148.7

Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Sub-Project: Fucus Monitoring/Experimental Study
Agency: University of Alaska - Fairbanks

FORM 3B
SUB-PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Office supplies- paper goods, binders, general office materials	$2.0	$1.9
Intrm	Computer supplies- software, disks, tapes, printer supplies, peripherals	$1.0	$1.8
	Laboratory supplies- misc. sorting materials, chemicals, supplies	$1.0	$0.5
	Field supplies- field sampling gear, raingear/boots, hand tools, marking instruments, recording meters	$0.0	$6.5
	Oceanography/circulation drogues	$0.0	$0.5
	Misc. supplies	$0.8	$0.5
	Commodities Total	$4.8	$11.7
Equipment:		$0.0	$0.0
Rept	Skiff	$0.0	$2.8
Intrm	Computer upgrades	$0.0	$3.0
	Equipment Total	$0.0	$5.8

Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Sub-Project: Fucus Monitoring/Experimental Study
Agency: University of Alaska - Fairbanks

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: 1995 Herring Bay Monitoring and Experimental Study- This is a continuation of a long term intertidal study in Herring Bay to understand the factors that limit and/or facilitate recolonization of intertidal invertebrates and intertidal algae. This study will continue to provide long term intertidal data.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 96 Field	Comment 95 Report
Personnel	$0.0	$0.0	$9.5	$9.5	$16.9	$13.2	$3.7
Travel	$0.0	$0.0	$3.5	$3.5	$7.1	$5.3	$1.8
Contractual	$0.0	$0.0	$1.8	$1.8	$3.2	$2.5	$0.7
Commodities	$0.0	$0.0	$0.7	$0.7	$1.1	$0.9	$0.2
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$15.5	$15.5	$28.3	$21.9	$6.4
General Administration	$0.0	$0.0	$1.6	$1.6	$2.8	$2.2	$0.6
Project Total	$0.0	$0.0	$17.1	$17.1	$31.1	$24.1	$7.0
Full-time Equivalents (FTE)		0.0	0.1	0.1			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Rem Investigator - Dr. Larry Deysher	0.0	$0.0	1.0	$9.5
Personnel Total	0.0	$0.0	1.0	$9.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Sub-Project: Fucus Monitoring/Experimental Study
Agency: Coastal Resources Associated (CRA)

FORM 4A
SUB-PROJECT
CONTRACTUAL
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept Intrm	Round trip - Calif. to Anchorage/Juneau, travel to Alaska for field work in Herring Bay, for consulting on the final report and for preparation of SOP for the 1995 field season.	$0.0	$3.5
	Travel Total	$0.0	$3.5
Contractual:			
	Long distance phone charges, on-line services, rent, insurance	$0.0	$1.8
	Contractual Total	$0.0	$1.8

Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Sub-Project: Fucus Monitoring/Experimental Study
Agency: Coastal Resources Associated (CRA)

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Office supplies/publications and materials/data slides/Postage/Computer disks	$0.0	$0.7
Intrm			
	Commodities Total	$0.0	$0.7
Equipment:		$0.0	$0.0
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95086-C
Project Title: Herring Bay Monitoring and Experimental Study
Sub-Project: Fucus Monitoring/Experimental Study
Agency: Coastal Resources Associated (CRA)

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Project Description: One hypothesis for a lack of recovery of sea otters is that food availability is limiting. Sea urchins provide an important potential food source for otters An increase in urchin populations may provide food for otters that may offset otherwise impoverished food supplies. In addition, increased in sea urchin densities may lead to drastic changes within the benthic community. Sea urchins can have profound effects on nearshore communities, including a reduction in kelps which provide substrate for herring spawn. This project will monitor these potential changes.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 96 Field	Comment 95 Report
Personnel	$0.0	$0.0	$6.0	$6.0	$7.2	$3.0	$4.2
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$39.2	$39.2	$65.4	$39.2	$26.2
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$45.2	$45.2	$72.6	$42.2	$30.4
General Administration	$0.0	$0.0	$3.6	$3.6	$5.7	$3.2	$2.5
Project Total	$0.0	$0.0	$48.8	$48.8	$78.3	$45.4	$32.9
Full-time Equivalents (FTE)		0.0	0.1	0.1			

Dollar amounts are shown in thousands of dollars.

This project budget is based upon it heavily using charters and other services in project 95106. If 95106 is not funded and 95087 is, additional funding will be needed to collect the samples for the urchin project.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95087
Project Title: Sea Urchin Population Dynamics: Changes in Population Density and Availability as Prey of Sea Otters
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

			Reprt/Intrm	Remaining
Travel:				
Rept			$0.0	$0.0
Intrm				
		Travel Total	$0.0	$0.0
Contractual:				
RSA with UAF to conduct the study to monitor changes in the population density and availability of sea urchins as a food source for sea otters. The line item breakout of this RSA is as follows:				$39.2
	100	$2.4		
	200	$2.0		
	300	$28.0 Subcontracts for vessel charter ($20.0) and CRA ($8.0)		
	400	$0.3		
	500	$0.0		
Subtotal		$32.7		
UAF General Admin		$6.5		
RSA Total		$39.2		
		Contractual Total	$0.0	$39.2

Project Number: 95087
Project Title: Sea Urchin Population Dynamics: Changes in Population Density and Availability as Prey of Sea Otters
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

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

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Project Number: 95087
Project Title: Sea Urchin Population Dynamics: Changes in Population Density and Availability as Prey of Sea Otters
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project proposes to further develop an information management system that began with the establishment of the Oil Spill Public Information Center (OSPIC) in September 1990 as a public repository for information and materials generated as a result of cleanup, damage assessment and restoration efforts following the Exxon Valdez oil spill. When fully developed, this system will contain distinct, but interrelated components, designed to make information relevant to the Exxon Valdez oil spill readily available for use by managers, scientists, and the public. The information will support restoration planning, management and policy making, scientific research and coordination, and public information. A central access point will be the OSPIC, with the potential for the establishment of additional access points.

Budget Category:	1994 Project No. 94423 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$117.6	$159.0	$141.6	$300.6	$300.6	
Travel	$1.3	$1.3	$5.1	$6.4	$6.4	
Contractual	$81.5	$97.8	$100.0	$197.8	$197.8	
Commodities	$20.8	$15.5	$9.0	$24.5	$24.5	
Equipment	$3.6	$0.5	$2.0	$2.5	$2.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$224.8	$274.1	$257.7	$531.8	$531.8	
General Administration	$23.3	$30.7	$28.2	$58.9	$58.9	
Project Total	$248.1	$304.8	$285.9	$590.7	$590.7	
Full-time Equivalents (FTE)	2.3	3.0	2.3	5.3	5.3	

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95089
Project Title: Information Management System
Agency: All

FORM 2A PROJECT DETAIL

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

Project Description: Synthesis and Dissemination - this sub-project provides for the development of two specific products designed to integrate and present in usable format information relevant to the Exxon Valdez oil spill.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$141.6	$141.6	$141.6	
Travel	$0.0	$0.0	$5.1	$5.1	$5.1	
Contractual	$0.0	$0.0	$100.0	$100.0	$100.0	
Commodities	$0.0	$0.0	$9.0	$9.0	$9.0	
Equipment	$0.0	$0.0	$2.0	$2.0	$2.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$257.7	$257.7	$257.7	
General Administration	$0.0	$0.0	$28.2	$28.2	$28.2	
Project Total	$0.0	$0.0	$285.9	$285.9	$285.9	
Full-time Equivalents (FTE)	0.0	0.0	2.3	2.3	2.3	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Natural Resources Manager	0.0	$0.0	6.0	$36.0
Analyst Programmer, GIS Specialist	0.0	$0.0	12.0	$62.4
Analyst Programmer, GIS Specialist	0.0	$0.0	8.0	$37.6
Systems Analyst	0.0	$0.0	1.0	$5.6
Personnel Total	0.0	$0.0	27.0	$141.6

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95089B
Project Title: Information Management System
Sub-Project: Synthesis and Dissemination
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel to oil spill area to solicit information and verify existing information ($300 airfare + 3.5 days per diem @ 100/day - 6 trips)		$4.0
Travel to meet with consultant during program development and design ($600 airfare + 5 days per diem @ $100/day)		$1.1
Travel Total	$0.0	$5.1
Contractual:		
Technical Support Services:		
Consulting services to ensure integrity of database design		$25.0
Consulting services, program design and coordination		$10.0
Consulting services, audiovisual cataloguing		$10.0
Consulting services, scripting and programing		$24.0
Consulting services, graphics, scanning, digitizing		$10.0
Hardware and software licensing and maintenance		$5.0
Training		$3.0
Document reproduction		$13.0
Contractual Total	$0.0	$100.0

Project Number: 95089B
Project Title: Information Management System
Sub-Project: Synthesis and Dissemination
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Data processing supplies, data cartridges, digital tapes		$7.0
Office supplies		$2.0
Commodities Total	$0.0	$9.0
Equipment:		
Dedicated large capacity hard drive		$2.0
Equipment Total	$0.0	$2.0

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Project Number: 95089B
Project Title: Information Management System
Sub-Project: Synthesis and Dissemination
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Oil Spill Information Center - the OSPIC responds to inquiries from local, state, national and international users, including but not limited to students, educators, scientists, government agency personnel, state and federal legislators, environmentalists, the business community, the media, the legal profession, and other libraries and information providers. In addition, the OSPIC staff provides priority information service to the Trustee Council, the Executive Director, the Director of Operations, the Public Information Officer, and the staff of the Exxon Valdez Restoration Office. Through reference services provided to restoration project personnel, the OSPIC serves all restoration activities.

Budget Category:	1994 Project No. 94423 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$117.6	$159.0	$0.0	$159.0	$159.0	
Travel	$1.3	$1.3	$0.0	$1.3	$1.3	
Contractual	$81.5	$97.8	$0.0	$97.8	$97.8	
Commodities	$20.8	$15.5	$0.0	$15.5	$15.5	
Equipment	$3.6	$0.5	$0.0	$0.5	$0.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$224.8	$274.1	$0.0	$274.1	$274.1	
General Administration	$23.3	$30.7	$0.0	$30.7	$30.7	
Project Total	$248.1	$304.8	$0.0	$304.8	$304.8	
Full-time Equivalents (FTE)	2.3	3.0	0.0	3.0	3.0	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See individual 3A forms for personnel details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95089A
Project Title: Information Management System
Sub-Project: Oil Spill Public Information Center
Agency: Oil Spill Information Center Summary

FORM 3A SUB-PROJECT DETAIL

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

Project Description: Oil Spill Information Center - the OSPIC responds to inquiries from local, state, national and international users, including but not limited to students, educators, scientists, government agency personnel, state and federal legislators, environmentalists, the business community, the media, the legal profession, and other libraries and information providers. In addition, the OSPIC staff provides priority information service to the Trustee Council, the Executive Director, the Director of Operations, the Public Information Officer, and the staff of the Exxon Valdez Restoration Office. Through reference services provided to restoration project personnel, the OSPIC serves all restoration activities.

Budget Category:	1994 Project No. 94423 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$81.5	$97.8	$0.0	$97.8	$97.8	
Commodities	$20.8	$15.5	$0.0	$15.5	$15.5	
Equipment	$3.6	$0.5	$0.0	$0.5	$0.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$105.9	$113.8	$0.0	$113.8	$113.8	
General Administration	$5.7	$6.8	$0.0	$6.8	$6.8	
Project Total	$111.6	$120.6	$0.0	$120.6	$120.6	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95089A
Project Title: Information Management System
Sub-Project: Oil Spill Public Information Center
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Postage (mass mailouts), courier	$6.0	
Simpson Building lease: 2,652 sq ft on first floor. Includes rent and renovation for library, hallway, bathrooms, and second floor storage ($4,000/ month)	$48.0	
Telecommunications - local, long distance, and 800 service, including 4 data lines (1 fax, 3 modem)	$7.5	
Equipment maintenance agreements - copier, reader/printer, fax machine, postage meter/scale, phone	$9.5	
Freight and cartage of equipment and supplies	$0.5	
Document printing and copying, includes copyright fees for reproduction of journal articles	$1.2	
Equipment repair not covered by maintenance agreements	$0.5	
Western Library Network	$6.0	
DIALOG - online database services	$6.0	
Subscriptions - regulations, newspapers, journals	$9.0	
Conference and training fees	$0.8	
Library Association fees	$0.8	
Parking	$2.0	
Contractual Total	$97.8	$0.0

Project Number: 95089A
Project Title: Information Management System
Sub-Project: Oil Spill Public Information Center
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Expendable office supplies, including library supplies, ink packs, ribbons, paper products	$4.8	
Data processing supplies (disks, tapes, cables, printer cartridges, etc.)	$1.5	
Postal supplies: meter tape, tyvek envelopes, padded mailers	$1.2	
Library acquisitions (books, maps, videos, audio tapes, slides, reprints)	$6.8	
Household and institutional supplies (cleaning agents, humidifier water treatment)	$0.2	
Replacement parts for equipment	$1.0	
Commodities Total	$15.5	$0.0
Equipment:		
14,400 baud modem for Internet service	$0.5	
Equipment Total	$0.5	$0.0

Project Number: 95089A
Project Title: Information Management System
Sub-Project: Oil Spill Public Information Center
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Oil Spill Information Center - the OSPIC responds to inquiries from local, state, national and international users, including but not limited to students, educators, scientists, government agency personnel, state and federal legislators, environmentalists, the business community, the media, the legal profession, and other libraries and information providers. In addition, the OSPIC staff provides priority information service to the Trustee Council, the Executive Director, the Director of Operations, the Public Information Officer, and the staff of the Exxon Valdez Restoration Office. Through reference services provided to restoration project personnel, the OSPIC serves all restoration activities.

Budget Category:	1994 Project No. 94423 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$117.6	$159.0	$0.0	$159.0	$159.0	
Travel	$1.3	$1.3	$0.0	$1.3	$1.3	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$118.9	$160.3	$0.0	$160.3	$160.3	
General Administration	$17.6	$23.9	$0.0	$23.9	$23.9	
Project Total	$136.5	$184.2	$0.0	$184.2	$184.2	
Full-time Equivalents (FTE)	2.3	3.0	0.0	3.0	3.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Librarian III	12.0	$62.9		
Librarian II	12.0	$55.4		
Library Assisant	12.0	$40.7		
Personnel Total	36.0	$159.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95089A
Project Title: Information Management System
Sub-Project: Oil Spill Public Information Center
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Air fare to attend 1995 International Oil Spill Conference 2/27-3/2/95 in Long Beach California (Estimated $800 air fare plus 7 days per diem @$66/day)	$1.3	
Travel Total	$1.3	$0.0
Contractual:		
Contractual Total	$0.0	$0.0

Project Number: 95089A
Project Title: Information Management System
Sub-Project: Oil Spill Public Information Center
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

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

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Project Number: 95089A
Project Title: Information Management System
Sub-Project: Oil Spill Public Information Center
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: During FFY 94 NOAA and DEC personnel visited and sampled approximately 40 mussel beds, and treated approximately 16 to remove hydrocarbons underneath the mussel beds. This request is for funds to complete data and hydrocarbon sample analysis and report writing for the 1994 field work. Funds are also requested for the 1995 field season to monitor the effectiveness of treatment and to look at the natural rate of recovery on untreated control beds.

Budget Category:	1994 Project No. 94090 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$281.7	$127.2	$137.8	$265.0	$128.0	
Travel	$32.4	$5.6	$22.9	$28.5	$26.5	
Contractual	$222.9	$1.7	$67.8	$69.5	$28.4	
Commodities	$81.2	$6.7	$20.5	$27.2	$12.4	
Equipment	$0.0	$0.0	$4.0	$4.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$618.2	$141.2	$253.0	$394.2	$195.3	
General Administration	$57.8	$19.2	$25.4	$44.6	$21.1	
Project Total	$676.0	$160.4	$278.4	$438.8	$216.4	
Full-time Equivalents (FTE)	4.5	2.1	2.3	4.3	2.0	
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Agency: National Oceanic & Atmospheric Admin.

FORM 2A PROJECT DETAIL

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

Project Description: During FFY 94 NOAA and DEC personnel visited and sampled approximately 40 mussel beds, and treated approximately 16 to remove hydrocarbons underneath the mussel beds. This request is for funds to complete data and hydrocarbon sample analysis and report writing for the 1994 field work. Funds are also requested for the 1995 field season to monitor the effectiveness of treatment and to look at the natural rate of recovery on untreated control beds.

Budget Category:	1994 Project No. 94090 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$181.1	$98.4	$98.9	$197.3	$121.0	
Travel	$28.3	$2.3	$14.0	$16.3	$26.5	
Contractual	$12.0	$0.0	$39.6	$39.6	$28.0	
Commodities	$74.2	$6.0	$16.5	$22.5	$12.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$295.6	$106.7	$169.0	$275.7	$187.5	
General Administration	$28.0	$14.8	$17.6	$32.4	$20.1	
Project Total	$323.6	$121.5	$186.6	$308.1	$207.6	
Full-time Equivalents (FTE)	2.9	1.7	1.6	3.2	2.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Project Leader (GS-12)	2.0	$13.9	3.5	$24.3
	Zoologist (GS-9)	7.0	$28.7	5.0	$20.6
	Chemist (GS-11)	7.0	$34.8	5.0	$24.8
	Fish Biologist (GS-11)	3.1	$16.6	3.5	$19.0
	Senior Chemist (GS-13)	0.0	$0.0	1.0	$7.1
	Program Manager (GS-12)	0.9	$4.4	0.6	$3.1
	Personnel Total	20.0	$98.4	18.6	$98.9

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project:
Agency: National Oceanic & Atmospheric Admin

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Juneau to Anchorage for Trustee and workshop meetings ($450 air fare/trip + 2.5 days per diem @ $225/day -- 4 trips)	$2.3	$2.3
	Juneau to Valdez for restoration monitoring/pristane sampling ($547 air fare/trip + 6 days per diem/trip @ $200/day -- 4 trips)	$0.0	$7.0
	Juneau to Cordova for restoration monitoring/pristane sampling ($352 air fare/trip + 6 days per diem/trip @ $200/day -- 3 trips)	$0.0	$4.7
	Travel Total	$2.3	$14.0
Contractual:			
Rept Intrm	Helicopter charter to Prince William Sound for restoration monitoring and pristane sampling (12 days @ $2,333.33/day including fuel)	$0.0	$28.0
	Float plane charter to Prince William Sound for restoration monitoring and pristane sampling (15 days @ $775/day)	$0.0	$11.6
	Contractual Total	$0.0	$39.6

Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Chemistry laboratory supplies: glassware, gloves, stoppers, tubing, eye guards, detergent, first aid supplies, etc.	$4.0	$8.5
	Consumable office supplies	$0.5	$1.0
	Film processing	$0.4	$0.8
	Report reproduction	$0.6	$0.0
	Field supplies: consumables, HC free sample jars, sampling gear	$0.0	$5.7
	Computer software upgrades and computer repair parts	$0.5	$0.5
	Commodities Total	$6.0	$16.5
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: During FFY 94 NOAA and DEC personnel visited and sampled approximately 40 mussel beds, and treated approximately 16 to remove hydrocarbons underneath the mussel beds. This request is for funds to complete data and hydrocarbon sample analysis and report writing for the 1994 field work. Funds are also requested for the 1995 field season to monitor the effectiveness of treatment and to look at the natural rate of recovery on untreated control beds.

Budget Category:	1994 Project No. 94090 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$83.8	$28.8	$10.3	$39.1	$3.5	
Travel	$4.1	$3.3	$4.8	$8.1	$0.0	
Contractual	$210.7	$1.7	$1.8	$3.5	$0.2	
Commodities	$7.0	$0.7	$0.0	$0.7	$0.2	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$305.6	$34.5	$16.9	$51.4	$3.9	
General Administration	$27.3	$4.4	$1.7	$6.1	$0.5	
Project Total	$332.9	$38.9	$18.6	$57.5	$4.4	
Full-time Equivalents (FTE)	1.3	0.4	0.1	0.5	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Restoration Specialist (R23)	3.5	$24.1	1.5	$10.3
	Restoration Specialist (R18)	1.0	$4.7	0.0	$0.0
	Personnel Total	4.5	$28.8	1.5	$10.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Juneau to Anchorage ($450/trip + 2.5 days per deim @ $150/day x 4 trips)	$3.3	$0.0
	Anchorage to Prince William Sound ($300 air fare/trip +6 days per diem @ $150/day -- 4 trips)	$0.0	$4.8
	Travel Total	$3.3	$4.8
Contractual:			
Rept	Long distance phone and fax	$0.4	$0.0
	Mail and courier	$0.3	$0.0
	Copying	$0.3	$0.0
	Printing of Final Report	$0.5	$0.0
	Freight and cartage	$0.2	$0.0
	Charter to Prince William Sound to monitor mussel bed treatment sites ($900 x 2 days)	$0.0	$1.8
	Contractual Total	$1.7	$1.8

Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Office supplies	$0.3	$0.0
	Computer supplies	$0.4	$0.0
	Commodities Total	$0.7	$0.0
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This subproject will conduct recovery monitoring of oiled mussel beds impacted by the Exxon Valdez oil spill in the northwestern Gulf of Alaska. Chemical monitoring of mussel beds and associated sediments will be continued.

Budget Category:	1994 Project No. 94090 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$16.8	$0.0	$28.6	$28.6	$3.5	
Travel	$0.0	$0.0	$4.1	$4.1	$0.0	
Contractual	$0.2	$0.0	$26.4	$26.4	$0.2	
Commodities	$0.0	$0.0	$4.0	$4.0	$0.2	
Equipment	$0.0	$0.0	$4.0	$4.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$17.0	$0.0	$67.1	$67.1	$3.9	
General Administration	$2.5	$0.0	$6.1	$6.1	$0.5	
Project Total	$19.5	$0.0	$73.2	$73.2	$4.4	
Full-time Equivalents (FTE)	0.3	0.0	0.6	0.6	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Marine Ecologist (GS-12)	0.0	$0.0	3.0	$18.6
	Biological Technician (GS-7)	0.0	$0.0	4.0	$10.0
	Personnel Total	0.0	$0.0	7.0	$28.6

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project: Gulf of Alaska Mussel Bed Monitoring
Agency: Dept. of Interior, National Biological Survey

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	Anchorage to Gulf of Alaska ($550/trip + 1 day per diem @ $200/day x 3 trips)	$0.0	$2.3
	Travel to scientific symposium ($900 air fare/trip + 6 days per diem @ $150/day -- 1 trip)	$0.0	$1.8
	Travel Total	$0.0	$4.1
Contractual:			
Rept	Boat charter 12 days @ $2,000/day	$0.0	$24.0
	Aircraft charter (through DOI's office of Aircraft Services)	$0.0	$2.0
	Film processing, reproductions	$0.0	$0.4
	Contractual Total	$0.0	$26.4

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1995

Printed: 9/12/94 11:56 AM

Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project: Gulf of Alaska Mussel Bed Monitoring
Agency: Dept. of Interior, Nationl Biological Survey

FORM 3B
SUB-
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Field and safety gear (rain gear,rubber boots, radios, batteries, survival gear)	$0.0	$1.5
	Sampling jars (I-chem)	$0.0	$0.4
	Sampling tools and supplies (utensils, putty knives, trowels, miscellaneous tapes, chemicals)	$0.0	$0.2
	Sample shipments	$0.0	$0.1
	Film	$0.0	$0.1
	Publication costs	$0.0	$0.7
	Software and upgrades	$0.0	$1.0
	Commodities Total	$0.0	$4.0
Equipment:			
Rept	Laptop computer	$0.0	$4.0
	Equipment Total	$0.0	$4.0

Project Number: 95090
Project Title: Mussel Bed Restoration and Monitoring
Sub-Project: Gulf of Alaska Mussel Bed Monitoring
Agency: Dept. of Interior, National Biological Survey

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Killer Whate Recovery Monitoring

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$29.3	$0.0	$23.0	$23.0	$21.0	
Travel	$0.0	$0.0	$6.0	$6.0	$3.0	
Contractual	$0.0	$0.0	$50.0	$50.0	$0.0	
Commodities	$0.0	$0.0	$24.0	$24.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$29.3	$0.0	$103.0	$103.0	$24.0	
General Administration	$4.4	$0.0	$7.0	$7.0	$3.2	
Project Total	$33.7	$0.0	$110.0	$110.0	$27.2	
Full-time Equivalents (FTE)		0.0	0.6	0.6		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rem	Program Manager GS12	0.0	$0.0	1.0	$5.0
	Project Leader GS12	0.0	$0.0	2.0	$10.0
	Field Assistants, 2 GS7	0.0	$0.0	4.0	$8.0
	Personnel Total	0.0	$0.0	7.0	$23.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95092
Project Title: Killer Whale Recovery Monitoring
Agency: National Oceanic & Atmospheric Admin

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rem	3 round trips Seattle to Prince William Sound at $2k/trip	$0.0	$6.0
	Travel Total	$0.0	$6.0
Contractual:			
Rem	Logistical support of field research team (ie, boat charter, village supports)	$0.0	$50.0
	Contractual Total	$0.0	$50.0

07/14/93

1995

Printed: 9/12/94 11:57 AM

Project Number: 95092
Project Title: Killer whale Recovery Monitoring
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Rem		
Film purchase and development, fuel, food	$0.0	$8.5
Maintenance of research equipment (boats, cameras)	$0.0	$5.5
Transport of boats and equipment	$0.0	$10.0
Commodities Total	$0.0	$24.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

07/14/93

1995

Printed: 9/12/94 11:57 AM

Project Number: 95092
Project Title: Killer Whale Recovery Monitoring
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Administration, Public Information and Scientific Management - This project provides for overall management, administration and implementation of the Trustee Council's restoration program. This project makes extensive use of existing Trustee Council agency structures to keep administrative costs to a minimum. The FFY 95 project represents the final step in reorganization of the administration of Trustee Council executive staff and operations.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$1,960.0	$0.0	$1,811.0	$1,811.0	$1,811.0	This project has five sub-projects: Chief Scientist: Science Review Board and Peer Review, Office of the Executive Director, Operations, Public Advisory Group and Community Involvement, and Restoration Work Force.
Travel	$305.0	$0.0	$268.8	$268.8	$268.8	
Contractual	$1,385.0	$0.0	$1,108.5	$1,108.5	$1,058.5	
Commodities	$112.2	$0.0	$70.4	$70.4	$70.4	
Equipment	$113.3	$0.0	$30.5	$30.5	$30.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$3,875.5	$0.0	$3,289.2	$3,289.2	$3,239.2	
General Administration	$349.3	$0.0	$308.0	$308.0	$307.0	The proposed FFY 95 budget represents a substantial reduction in costs relative to FFY 94 budget.
Project Total	$4,224.8	$0.0	$3,597.2	$3,597.2	$3,546.2	
Full-time Equivalents (FTE)	26.0	0.0	23.3	23.3	23.3	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information & Scientific Management
Agency: All

FORM 2A PROJECT DETAIL

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

Project Description: The Trustee Council and the Trustee Council-supported principal investigators need access to the best possible scientific knowledge and understanding concerning injured resources and services. This information has been provided continuously by the Chief Scientist and expert peer reviewers since the injury assessment process started in 1989. This sub-project provides support or scientific support services required by the Trustee Council, Executive Director and principle investigators.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$3.0	$0.0	$6.5	$6.5	$6.5	
Travel	$0.0	$0.0	$1.4	$1.4	$1.4	
Contractual	$500.0	$0.0	$450.0	$450.0	$400.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$503.0	$0.0	$457.9	$457.9	$407.9	
General Administration	$23.0	$0.0	$22.5	$22.5	$21.5	
Project Total	$526.0	$0.0	$480.4	$480.4	$429.4	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1	0.1	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Natural Resource Manager	0.0	$0.0	1.0	$6.5
Personnel Total	0.0	$0.0	1.0	$6.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information & Scientific Management
Sub-Project: Chief Scientist
Agency: AK Dept. of N[illegible]al Resources

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Two trips Anchorage to Juneau to deal with matters pertaining to scientific support contract Airfare $444, per diem 2 days @ $150/day		$1.4
Travel Total	$0.0	$1.4
Contractual:		
Contract to provide scientific support services to Trustee Council, including functions performed by Chief Scientist and Peer Reviewers. A contract will be executed in compliance with State contracting regulations. The contractor will bill and be paid monthly based on services rendered monthly, throughout the entire fiscal year.		$450.0
Contractual Total	$0.0	$450.0

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project:Chief Scientist
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-PROJECT DETAIL

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

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

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project:Chief Scientist
Agency: AK Dept. of N[illegible]al Resources

FORM 3B SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides funding for the Executive Director and immediate support staff. The budget for the Executive Director includes salaries, benefits, travel, office space, supplies, printing costs, contractual services, utilities, and other such items as may be necessary for efficient operation of the Juneau office of the Executive Director and the Director of Administration. In addition to budget and audit responsibilities, the Director of Administration is assuming the duties once performed by the six-member Finance Committee: developing fiscal procedures, adherence to the procedures, and insuring overall fiscal standards and reporting for accountability, and efficiency.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$207.5	$0.0	$260.4	$260.4	$260.4	
Travel	$35.8	$0.0	$25.6	$25.6	$25.6	
Contractual	$24.8	$0.0	$139.8	$139.8	$139.8	
Commodities	$9.7	$0.0	$9.7	$9.7	$9.7	
Equipment	$13.0	$0.0	$8.0	$8.0	$8.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$290.8	$0.0	$443.5	$443.5	$443.5	
General Administration	$14.1	$0.0	$26.4	$26.4	$26.4	
Project Total	$304.9	$0.0	$469.9	$469.9	$469.9	
Full-time Equivalents (FTE)	2.3	0.0	3.0	3.0	3.0	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See individual sub-project 3A forms for personnel details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: Office of the Executive Director Summary

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides fundinG for the Executive Director and immediate support staff. The budget for the Executive Director includes salaries, benefits, travel, office space, supplies, printing costs, contractual services, utilities, and other such items as may be necessary for efficient operation of the Juneau office of the Executive Director and the Director of Administration. In addition to budget and audit responsibilities, the Director of Administration is assuming the duties once performed by the six-member Finance Committee: developing fiscal procedures, adherence to the procedures, and insuring overall fiscal standards and reporting for accountability, and efficiency.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$7.3	$0.0	$67.3	$67.3	$67.3	
Commodities	$9.7	$0.0	$9.7	$9.7	$9.7	
Equipment	$13.0	$0.0	$8.0	$8.0	$8.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$30.0	$0.0	$85.0	$85.0	$85.0	
General Administration	$0.5	$0.0	$4.7	$4.7	$4.7	
Project Total	$30.5	$0.0	$89.7	$89.7	$89.7	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100

Project Title: Administration, Public Information and Science Management

Sub-Project: Office of the Executive Director

Agency: AK Dept. of E[illegible]onmental Conservation

FORM 3A SUB-PROJECT DETAIL

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Contract to provide audit services. Scope of services to include a financial review of FY 92,93, and 94; review and recommendation for improvement of fiscal procedures; review and recommendation for improvement of inventory control procedures; etc.		$60.0
Telecommunication, postage and courier		$2.5
Aircraft charters to spill area		$1.6
Newspaper and periodical subscriptions		$0.4
Printing and reproduction		$0.5
Photographic developing and printing		$0.2
Minor repair and maintenance		$0.4
Tuition and fees for training		$1.0
Freight and cartage		$0.7
Contractual Total	$0.0	$67.3

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: AK Dept. of Environmental Conservation

FORM 3B SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Computer software and upgrades		$2.5
Consumable office supplies (paper, letterhead, pens, ink packs, toner cartridges, etc.)		$3.5
Materials for archiving records, information and data		$0.2
Data processing supplies		$2.5
Replacement parts and upgrades for equipment		$1.0
Commodities Total	$0.0	$9.7
Equipment:		
Office equipment (desks, chairs, cabinets, shelves, bookcases, tables, etc.)		$8.0
Equipment Total	$0.0	$8.0

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: AK Dept. of E[illegible]onmental Conservation

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides funding for the Executive Director and immediate support staff. The budget for the Executive Director includes salaries, benefits, travel, office space, supplies, printing costs, contractual services, utilities, and other such items as may be necessary for efficient operation of the Juneau office of the Executive Director and the Director of Administration. In addition to budget and audit responsibilities, the Director of Administration is assuming the duties once performed by the six-member Finance Committee: developing fiscal procedures, adherence to the procedures, and insuring overall fiscal standards and reporting for accountability, and efficiency.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$207.5	$0.0	$260.4	$260.4	$260.4	
Travel	$35.8	$0.0	$25.6	$25.6	$25.6	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$243.3	$0.0	$286.0	$286.0	$286.0	
General Administration	$12.4	$0.0	$16.6	$16.6	$16.6	
Project Total	$255.7	$0.0	$302.6	$302.6	$302.6	
Full-time Equivalents (FTE)	2.3	0.0	3.0	3.0	3.0	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Executive Director	0.0	$0.0	12.0	$113.3
Director of Administration	0.0	$0.0	12.0	$100.9
Administrative Assistant	0.0	$0.0	12.0	$46.2
Personnel Total	0.0	$0.0	36.0	$260.4

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Executive Director:		
Juneau-Anchorage and spill area communities ($450 air fare/trip + 4 days per diem @ $150/day -- 19 trips)		$20.0
Juneau-Washington, D.C. ($1200 air fare/trip + 5 days per diem @ $150/day -- 1 trip)		$2.0
Director of Administration		
Juneau -Anchorage and spill area communities ($450 air fare/trip + 3 days per diem @ $150/day -- 4 trips)		$3.6
Travel Total	$0.0	$25.6
Contractual:		
Contractual Total	$0.0	$0.0

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: AK Dept. of F & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95100
Project Title: Administraton, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides funding for the Executive Director and immediate support staff. The budget for the Executive Director includes salaries, benefits, travel, office space, supplies, printing costs, contractual services, utilities, and other such items as may be necessary for efficient operation of the Juneau office of the Executive Director and the Director of Administration. In addition to budget and audit responsibilities, the Director of Administration is assuming the duties once performed by the six-member Finance Committee: developing fiscal procedures, adherence to the procedures, and insuring overall fiscal standards and reporting for accountability, and efficiency.

Budget Category:	1994 Project No. 94OED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$17.5	$0.0	$72.5	$72.5	$72.5	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$17.5	$0.0	$72.5	$72.5	$72.5	
General Administration	$1.2	$0.0	$5.1	$5.1	$5.1	
Project Total	$18.7	$0.0	$77.6	$77.6	$77.6	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: National Ocea & Atmospheric Admin.

FORM 3A SUB-PROJECT DETAIL

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Contract to provide audit services. Scope of services to include a financial review of FY 92,93, and 94; review and recommendation for improvement of fiscal procedures; review and recommendation for improvement of inventory control procedures; etc.		$50.0
Executive Director's Office lease in Juneau (twelve months @ $1,875/month)		$22.5
Contractual Total	$0.0	$72.5

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: National Oceanic & Atmospheric Admin.

FORM 3B SUB-PROJECT DETAIL

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

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

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Office of the Executive Director
Agency: National Ocea & Atmospheric Admin.

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This Committee provides financial oversight of the Exxon Valdez Oil Spill Settlement Funds.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$28.5	$0.0	$0.0	$0.0	$0.0
Travel	$6.5	$0.0	$0.0	$0.0	$0.0
Contractual	$0.8	$0.0	$0.0	$0.0	$0.0
Commodities	$0.2	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$36.0	$0.0	$0.0	$0.0	$0.0
General Administration	$4.2	$0.0	$0.0	$0.0	$0.0
Project Total	$40.2	$0.0	$0.0	$0.0	$0.0
Full-time Equivalents (FTE)	0.6	0.0	0.0	0.0	0.0
Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See individual sub-project 3A forms for personnel details				
Personnel Total	0.0	$0.0	0.0	$0.0

Comment

This sub-project was discontinued after 02/28/94. The duties of this sub-project have been carried out by the Director of Administration since that date.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Finance Committee
Agency: Finance Committee Summary

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding for staff support for key planning, coordination, communications, and project management functions of the Trustee Council. This budget also includes funds for public meetings, teleconferences, Trustee Council meetings, newsletters, brochures and other publications, as well as the operating costs for offices in the Simpson building in Anchorage.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$478.3	$0.0	$719.9	$719.9	$719.9	
Travel	$82.7	$0.0	$104.4	$104.4	$104.4	
Contractual	$706.1	$0.0	$450.1	$450.1	$450.1	
Commodities	$69.6	$0.0	$34.7	$34.7	$34.7	
Equipment	$85.8	$0.0	$20.0	$20.0	$20.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$1,422.5	$0.0	$1,329.1	$1,329.1	$1,329.1	
General Administration	$110.9	$0.0	$130.7	$130.7	$130.7	
Project Total	$1,533.4	$0.0	$1,459.8	$1,459.8	$1,459.8	
Full-time Equivalents (FTE)	7.2	0.0	9.5	9.5	9.5	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See individual sub-project 3A forms for personnel details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100

Project Title: Administration, Public Information and Science Management

Sub-Project: Operations

Agency: Operations Summary

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding for staff support for key planning, coordination, communications, and project management functions of the Trustee Council. This budget also includes funds for public meetings, teleconferences, Trustee Council meetings, newsletters, brochures and other publications, as well as the operating costs for offices in the Simpson building in Anchorage.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$42.7	$0.0	$85.0	$85.0	$85.0	
Travel	$32.3	$0.0	$12.0	$12.0	$12.0	
Contractual	$414.1	$0.0	$426.1	$426.1	$426.1	
Commodities	$69.6	$0.0	$34.7	$34.7	$34.7	
Equipment	$85.8	$0.0	$20.0	$20.0	$20.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$644.5	$0.0	$577.8	$577.8	$577.8	
General Administration	$27.2	$0.0	$33.8	$33.8	$33.8	
Project Total	$671.7	$0.0	$611.6	$611.6	$611.6	
Full-time Equivalents (FTE)	0.6	0.0	1.0	1.0	1.0	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Restoration Specialist	0.0	$0.0	6.0	$42.5
Restoration Specialist	0.0	$0.0	6.0	$42.5
Personnel Total	0.0	$0.0	12.0	$85.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Juneau to/from Anchorage and spill area communities ($450 air fare/trip + 3 days per diem @ $150/day -- 13 trips)		$12.0
Travel Total	$0.0	$12.0
Contractual:		
Central data management and support		$12.0
Postage, postage meter rental, courier, mail sorting and labelling		$19.0
Simpson building lease ($11,383/month) and parking		$148.0
Telecommunications		$60.0
Equipment maintenance agreements, equipment maintenance		$20.0
Meeting space rental for annual workshops		$30.0
Printing and design (newsletter, annual report, brochures)		$70.0
Trustee Council meeing costs (advertising, teleconferencing, transcribing)		$37.2
Public meeting costs		$2.0
Photo and video processing for annual report, workshop newsletter		$7.0
Training tuition and fees		$5.0
Aircraft charters to the spill area for public meetings		$5.0
Freight and cartage		$3.6
Miscellaneous advertising		$7.0
Subscriptions		0.3
Contractual Total	$0.0	$426.1

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of E[illegible]onmental Conservation

FORM 3B
SUB-PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Software and upgrades		$15.0
Expendable office supplies, ink packs, ribbons, paper products, and postage meter tapes		$12.7
Data processing supplies (disks, tapes, cables, connectors, printer cartridges, etc.)		$7.0
Commodities Total	$0.0	$34.7
Equipment:		
Computer 486/66 w/240M hard drive - 3@$2,900		$8.7
15" monitor - 3@ $800		$2.4
Computer repair parts (hard drives, floppy drives, boards, power supplies, etc.)		$8.9
Equipment Total	$0.0	$20.0

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding for staff support for key planning, coordination, communications, and project management functions of the Trustee Council. This budget also includes funds for public meetings, teleconferences, Trustee Council meetings, newsletters, brochures and other publications, as well as the operating costs for offices in the Simpson building in Anchorage.

Budget Category:	1994 Project No. 94OED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$410.1	$0.0	$634.9	$634.9	$634.9	
Travel	$36.0	$0.0	$92.4	$92.4	$92.4	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$446.1	$0.0	$727.3	$727.3	$727.3	
General Administration	$61.5	$0.0	$95.2	$95.2	$95.2	
Project Total	$507.6	$0.0	$822.5	$822.5	$822.5	
Full-time Equivalents (FTE)	6.3	0.0	8.5	8.5	10.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Director of Operations	0.0	$0.0	12.0	$105.2
Project Coordinator	0.0	$0.0	12.0	$86.2
Information Management Specialist	0.0	$0.0	12.0	$86.2
Executive Secretary III	0.0	$0.0	12.0	$57.2
Administrative Assistant	0.0	$0.0	12.0	$57.2
Restoration Specialist	0.0	$0.0	12.0	$78.6
Restoration Specialist	0.0	$0.0	6.0	$42.5
(Continued next page)				
Personnel Total	0.0	$0.0	102.0	$634.9

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of Fi[illegible] Game

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
(Continued from previous page)				
Information Specialist	0.0	$0.0	12.0	$60.9
Analyst Programmer	0.0	$0.0	12.0	$60.9

Travel:	Reprt/Intrm	Remaining
Anchorage to Juneau and spill area ($450 air fare/trip + 3 days per diem @ $150/day -- 31 trips		$27.9
Travel and per diem for staff training ($700 air fare/trip + 5 days per diem @ $150/day -- 3 trips		$4.5
Public meetings (travel to the spill affected area by staff to inform the public and gather input)		$15.0
Miscellaneous public outreach and workshop participation		$45.0
Travel Total	$0.0	$92.4

Contractual:		
Contractual Total	$0.0	$0.0

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

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

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of Fis Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding for staff support for key planning, coordination, communications, and project management functions of the Trustee Council. This budget also includes funds for public meetings, teleconferences, Trustee Council meetings, newsletters, brochures and other publications, as well as the operating costs for offices in the Simpson building in Anchorage.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$24.0	$24.0	$24.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$24.0	$24.0	$24.0	
General Administration	$0.0	$0.0	$1.7	$1.7	$1.7	
Project Total	$0.0	$0.0	$25.7	$25.7	$25.7	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
GIS mapping, data processing and analysis support		$24.0
Contractual Total	$0.0	$24.0

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of N al Resources

FORM 3A
SUB-PROJECT
DETAIL

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

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: AK Dept. of Natural Resources

FORM 3A
SUB-PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding for staff support for key planning, coordination, communications, and project management functions of the Trustee Council. This budget also includes funds for public meetings, teleconferences, Trustee Council meetings, newsletters, brochures and other publications, as well as the operating costs for offices in the Simpson building in Anchorage.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$25.5	$0.0	$0.0	$0.0	$0.0	
Travel	$14.4	$0.0	$0.0	$0.0	$0.0	
Contractual	$292.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$331.9	$0.0	$0.0	$0.0	$0.0	
General Administration	$22.2	$0.0	$0.0	$0.0	$0.0	
Project Total	$354.1	$0.0	$0.0	$0.0	$0.0	
Full-time Equivalents (FTE)	0.3	$0.0	0.0	0.0	0.0	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: Dept. of Agriculture, Forest Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

Contractual:		
Contractual Total	$0.0	$0.0

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-PROJECT DETAIL

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

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Operations
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Public Advisory Group and Community - This sub-project supports the Public Advisory Group. The Public Advisory Group consists of 17 members, plus 2 ad-hoc members from the State Legislature, representing 12 prinicipal interest groups and 5 members from the public-at-large. The role of the Public Advisory Group is to provide advice to the Trustee Council on such items as the annual work plans, budgets, and the Restoration Plan.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$45.6	$0.0	$52.1	$52.1	$52.1	
Travel	$38.0	$0.0	$63.5	$63.5	$63.5	
Contractual	$24.4	$0.0	$28.0	$28.0	$28.0	
Commodities	$1.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$109.0	$0.0	$143.6	$143.6	$143.6	
General Administration	$8.5	$0.0	$9.8	$9.8	$9.8	
Project Total	$117.5	$0.0	$153.4	$153.4	$153.4	
Full-time Equivalents (FTE)	1.0	0.0	1.1	1.1	1.1	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See individual sub-project 3A forms for personnel details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

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Project Number: 95100

Project Title: Administration, Public Information and Science Management

Sub-Project: Public Advisory Group

Agency: Public Advisory Group Summary

FORM 3A SUB-PROJECT DETAIL

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

Project Description: Public Advisory Group and Community - This sub-project supports the Public Advisory Group. The Public Advisory Group consists of 17 members, plus 2 ad-hoc members from the State Legislature, representing 12 prinicipal interest groups and 5 members from the public-at-large. The role of the Public Advisory Group is to provide advice to the Trustee Council on such items as the annual work plans, budgets, and the Restoration Plan.

Budget Category:	1994 Project No. 94OED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$18.0	$0.0	$28.0	$28.0	$28.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$18.0	$0.0	$28.0	$28.0	$28.0	
General Administration	$1.3	$0.0	$2.0	$2.0	$2.0	
Project Total	$19.3	$0.0	$30.0	$30.0	$30.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept				
Intrm				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Printing and copying ($800/meeting @ 5 meetings)		$4.0
Postage and courier ($250/meeting @ 5 meetings)		$1.3
Transcription services ($2,500/meeting @ 5 meetings)		$12.5
Advertising ($1,500/meeting @ 5 meetings)		$7.5
ADA compliance ($200/meeting @ 5meetings)		$1.0
Miscellaneous meeting costs		$1.7
Contractual Total	$0.0	$28.0

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group and Community Involvement
Agency: AK Dept. of E[illegible]nmental Conservation

FORM 3B
SUB-
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DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Public Advisory Group and Community Involvement - This sub-project supports the Public Advisory Group. The Public Advisory Group consists of 17 members, plus 2 ad-hoc members from the State Legislature, representing 12 prinicipal interest groups and 5 members from the public-at-large. The role of the Public Advisory Group is to provide advice to the Trustee Council on such items as the annual work plans, budgets, and the Restoration Plan.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$32.9	$0.0	$46.1	$46.1	$46.1	
Travel	$19.0	$0.0	$63.5	$63.5	$63.5	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$51.9	$0.0	$109.6	$109.6	$109.6	
General Administration	$4.9	$0.0	$6.9	$6.9	$6.9	
Project Total	$56.8	$0.0	$116.5	$116.5	$116.5	
Full-time Equivalents (FTE)	0.7	0.0	1.0	1.0	1.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Administrative Assistant II	0.0	$0.0	12.0	$46.1
Personnel Total	0.0	$0.0	12.0	$46.1

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel and per diem for PAG members for 4 meetings @ $10,000/meeting		$40.0
Travel and per diem for PAG members to spill area		$13.5
Travel and per diem for PAG members for miscellaneous meetings and workshops		$10.0
Travel Total	$0.0	$63.5
Contractual:		
Contractual Total	$0.0	$0.0

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: AK Dept. of F[illegible] Game

FORM 3B
SUB-PROJECT DETAIL

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

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Public Advisory Group - This sub-project supports the Public Advisory Group. The Public Advisory Group consists of 17 members, plus 2 ad-hoc members from the State Legislature, representing 12 prinicipal interest groups and 5 members from the public-at-large. The role of the Public Advisory Group is to provide advice to the Trustee Council on such items as the annual work plans, budgets, and the Restoration Plan.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$12.7	$0.0	$6.0	$6.0	$6.0	
Travel	$19.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$31.7	$0.0	$6.0	$6.0	$6.0	
General Administration	$1.9	$0.0	$0.9	$0.9	$0.9	
Project Total	$33.6	$0.0	$6.9	$6.9	$6.9	
Full-time Equivalents (FTE)	0.3	0.0	0.1	0.1	0.1	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Regional Environmental Assistant (OEA)	0.0	$0.0	1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100

Project Title: Administration, Public Information and Science Management

Sub-Project: Public Advisory Group

Agency: Dept. of Interi

FORM 3A SUB-PROJECT DETAIL

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

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: Dept. of Interior

FORM 3B
SUB-PROJECT DETAIL

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

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

Equipment:		
Equipment Total	$0.0	$0.0

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: Dept. of Interi

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Public Advisory Group This sub-project supports the Public Advisory Group. The Public Advisory Group consists of 17 members, plus 2 ad-hoc members from the State Legislature, representing 12 prinicipal interest groups and 5 members from the public-at-large. The role of the Public Advisory Group is to provide advice to the Trustee Council on such items as the annual work plans, budgets, and the Restoration Plan.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$6.4	$0.0	$0.0	$0.0	$0.0	
Commodities	$1.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$7.4	$0.0	$0.0	$0.0	$0.0	
General Administration	$0.4	$0.0	$0.0	$0.0	$0.0	
Project Total	$7.8	$0.0	$0.0	$0.0	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: Dept. of Agriculture, Forest Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: Dept. of Agric re, Forest Service

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Public Advisory Group
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. Agencies also receive funding for project management in association with individual projects. Costs involved in this budget are salaries, benefits, travel, per diem, equipment and commodities.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$1,197.1	$0.0	$772.1	$772.1	$772.1	
Travel	$142.0	$0.0	$73.9	$73.9	$73.9	
Contractual	$128.9	$0.0	$40.6	$40.6	$40.6	
Commodities	$31.7	$0.0	$26.0	$26.0	$26.0	
Equipment	$14.5	$0.0	$2.5	$2.5	$2.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$1,514.2	$0.0	$915.1	$915.1	$915.1	
General Administration	$188.6	$0.0	$118.6	$118.6	$118.6	
Project Total	$1,702.8	$0.0	$1,033.7	$1,033.7	$1,033.7	
Full-time Equivalents (FTE)	14.9	0.0	9.6	9.6	9.6	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
See individual sub-project 3A forms for personnel details				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: Restoration W Force Summary

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. Agencies also receive funding for project management in association with individual projects. Costs involved in this budget are salaries, benefits, travel, per diem, equipment and commodities.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$213.1	$0.0	$139.5	$139.5	$139.5	
Travel	$39.9	$0.0	$18.0	$18.0	$18.0	
Contractual	$61.9	$0.0	$17.9	$17.9	$17.9	
Commodities	$11.7	$0.0	$6.2	$6.2	$6.2	
Equipment	$2.5	$0.0	$2.5	$2.5	$2.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$329.1	$0.0	$184.1	$184.1	$184.1	
General Administration	$36.3	$0.0	$22.2	$22.2	$22.2	
Project Total	$365.4	$0.0	$206.3	$206.3	$206.3	
Full-time Equivalents (FTE)	2.6	0.0	1.5	1.5	1.5	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Restoration Chief	0.0	$0.0	12.0	$97.0
Restoration Specialist	0.0	$0.0	6.0	$42.5
Personnel Total	0.0	$0.0	18.0	$139.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Juneau to/from Anchorage and spill area communities ($450 air fare/trip + 3 days per diem @ $150/day -- 20 trips)		$18.0
Travel Total	$0.0	$18.0
Contractual:		
Long distance telecommunications, postage, adn courier		$7.0
Aircraft charters to spill area		$0.6
Newspaper and periodical subscripions		$0.5
Printing and reproduction		$3.5
Photographic developing and printing		$0.1
Minor repair and maintenance		$1.4
Tuition and fees for seminars and training		$1.0
Risk management (mandatory insurance)		$3.0
Freight and cartage of equipment and supplies		$0.8
Contractual Total	$0.0	$17.9

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of E[illegible]onmental Conservation

FORM 3B
SUB-PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Computer software and upgrades		$1.5
Consumable office supplies (paper, letterhead, pens, ink packs,toner cartridges, etc.)		$2.3
Data processing supplies (disks, tapes, cables, connecotrs, printer cartridges, etc.)		$1.4
Replacement parts and upgrades for equipment		$1.0
Commodities Total	$0.0	$6.2
Equipment:		
Data processing equipment repair parts		$1.5
Office equipment (chairs, cabinets, calculators, shelves, typewriters, etc.)		$1.0
Equipment Total	$0.0	$2.5

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-PROJECT DETAIL

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

Project Description: This sub-project provides the funding used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. Agencies also receive funding for project management in association with individual projects. Costs involved in this budget are salaries, benefits, travel, per diem, equipment and commodities.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$213.2	$0.0	$150.0	$150.0	$150.0	
Travel	$24.7	$0.0	$0.0	$0.0	$0.0	
Contractual	$11.7	$0.0	$0.0	$0.0	$0.0	
Commodities	$3.5	$0.0	$0.0	$0.0	$0.0	
Equipment	$1.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$254.1	$0.0	$150.0	$150.0	$150.0	
General Administration	$32.8	$0.0	$22.5	$22.5	$22.5	
Project Total	$286.9	$0.0	$172.5	$172.5	$172.5	
Full-time Equivalents (FTE)	2.5	0.0	1.7	1.7	1.7	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Chief of Restoration	0.0	$0.0	12.0	$93.3
Program Manager	0.0	$0.0	8.5	$56.7
Personnel Total	0.0	$0.0	20.5	$150.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of Fi[illegible] Game

FORM 3A SUB-PROJECT DETAIL

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

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

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

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

06/01/94

1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. Agencies also receive funding for project management in association with individual projects. Costs involved in this budget are salaries, benefits, travel, per diem, equipment and commodities.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$198.2	$0.0	$132.8	$132.8	$132.8	
Travel	$9.1	$0.0	$4.5	$4.5	$4.5	
Contractual	$25.4	$0.0	$20.4	$20.4	$20.4	
Commodities	$7.8	$0.0	$7.8	$7.8	$7.8	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$240.5	$0.0	$165.5	$165.5	$165.5	
General Administration	$31.5	$0.0	$21.3	$21.3	$21.3	
Project Total	$272.0	$0.0	$186.8	$186.8	$186.8	
Full-time Equivalents (FTE)	2.6	0.0	1.6	1.6	1.6	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Natural Resources Manager II	0.0	$0.0	12.0	$84.0
Natural Resources Manager I	0.0	$0.0	7.5	$48.8
Personnel Total	0.0	$0.0	19.5	$132.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Anchorage to Juneau and spill area communities ($450 air fare/trip + 2 days per diem @ $150/day - 6 trips)		$4.5
Travel Total	$0.0	$4.5
Contractual:		
Telecommunication and fax		$1.0
Postage		$0.4
Advertising		$3.0
Subscriptions		$0.5
Reproduction of documents		$2.0
Minor repair and maintenance		$2.0
Computer hardware maintenance, system support		$7.5
Computer software licensing fees		$2.0
Training for staff		$2.0
Contractual Total	$0.0	$20.4

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of N al Resources

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Office supplies		$2.5
Computer supplies, software and upgrades		$2.0
Supplies for document production		$1.8
Data processing supplies, disks, data cartridges		$1.5
Commodities Total	$0.0	$7.8
Equipment:		
Equipment Total	$0.0	$0.0

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-PROJECT DETAIL

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

Project Description: This sub-project provides the funding used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. Agencies also receive funding for project management in association with individual projects. Costs involved in this budget are salaries, benefits, travel, per diem, equipment and commodities.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$246.3	$0.0	$118.0	$118.0	$118.0	
Travel	$28.2	$0.0	$9.3	$9.3	$9.3	
Contractual	$27.9	$0.0	$0.0	$0.0	$0.0	
Commodities	$3.5	$0.0	$5.0	$5.0	$5.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$305.9	$0.0	$132.3	$132.3	$132.3	
General Administration	$38.9	$0.0	$17.7	$17.7	$17.7	
Project Total	$344.8	$0.0	$150.0	$150.0	$150.0	
Full-time Equivalents (FTE)	2.8	0.0	2.0	2.0	2.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Agency Liaison	0.0	$0.0	12.0	$55.0
Agency Liaison	0.0	$0.0	12.0	$63.0
Personnel Total	0.0	$0.0	24.0	$118.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: Dept. of Agric re, Forest Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Travel to Juneau		$9.3
Travel Total	$0.0	$9.3
Contractual:		
Contractual Total	$0.0	$0.0

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Resoration Work Force
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Supplies		$5.0
Commodities Total	$0.0	$5.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: Dept. of Agric[illegible]e, Forest Service

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. Agencies also receive funding for project management in association with individual projects. Costs involved in this budget are salaries, benefits, travel, per diem, equipment and commodities.

Budget Category:	1994 Project No. 940ED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$166.4	$0.0	$111.8	$111.8	$111.8	
Travel	$14.1	$0.0	$17.1	$17.1	$17.1	
Contractual	$2.0	$0.0	$2.3	$2.3	$2.3	
Commodities	$2.0	$0.0	$2.0	$2.0	$2.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$184.5	$0.0	$133.2	$133.2	$133.2	
General Administration	$25.1	$0.0	$16.9	$16.9	$16.9	
Project Total	$209.6	$0.0	$150.1	$150.1	$150.1	
Full-time Equivalents (FTE)	2.3	0.0	1.5	1.5	1.5	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Agency Liaison			6.0	$38.4
Restoration Specialist			3.0	$16.2
Restoration Specialist			3.0	$22.2
Federal Budget Office			6.0	$35.0
Personnel Total	0.0	$0.0	18.0	$111.8

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: Dept. of Interior

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Agency legal counsel: Washington DC to Anchorage (airfare $750, per diem $200, 5 days) - 3.5 trips		$6.5
Agency liaison: Anchorage to Washington DC (airfare $750, per diem $200, 5 days) - 2 trips		$3.5
Agency liaison: Anchorage to spill communities (airfare $450, per diem $200, 3 days) - 3.5 trips		$3.7
Restoration Staff: Anchorage to spill communities (airfare $450, per diem $200, 4 days) - 4 trips		$3.4
Travel Total	$0.0	$17.1
Contractual:		
Parking		$1.3
Seminars and training		$1.0
Contractual Total	$0.0	$2.3

Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: Dept. of Interi

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Computer software		$1.0
Computer upgrades		$0.5
Office supplies		$0.5
Commodities Total	$0.0	$2.0
Equipment:		
Equipment Total	$0.0	$0.0

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: Dept. of Interior

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This sub-project provides the funding used to support staff who function as agency liaisons. These liaisons serve as overseers of work plan development and generally represent the Trustee Council members in matters related to implementation of the restoration program. Agencies also receive funding for project management in association with individual projects. Costs involved in this budget are salaries, benefits, travel, per diem, equipment and commodities.

Budget Category:	1994 Project No. 94OED Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$159.9	$0.0	$120.0	$120.0	$120.0	
Travel	$26.0	$0.0	$25.0	$25.0	$25.0	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$3.2	$0.0	$5.0	$5.0	$5.0	
Equipment	$11.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$200.1	$0.0	$150.0	$150.0	$150.0	
General Administration	$24.0	$0.0	$18.0	$18.0	$18.0	
Project Total	$224.1	$0.0	$168.0	$168.0	$168.0	
Full-time Equivalents (FTE)	2.1	0.0	1.3	1.3	1.3	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
GS-14 Fishery Manager	0.0	$0.0	12.0	$96.0
GS-12 Fishery Biologist	0.0	$0.0	4.0	$24.0
Personnel Total	0.0	$0.0	16.0	$120.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95100

Project Title: Administration, Public Information and Science Management

Sub-Project: Restoration Work Force

Agency: National Oean[illegible] Atmospheric Admin.

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
15 trips Juneau - Anchorage or Seattle plus per diem at $1,000/trip		$15.0
10 trips Juneau - Anchorage plu per diem at $1,000/trip		$10.0
Travel Total	$0.0	$25.0
Contractual:		
Contractual Total	$0.0	$0.0

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1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Miscellaneous office supplies		$1.0
Computer software upgrades		$2.0
Computer upgrades and repairs		$2.0
Commodities Total	$0.0	$5.0
Equipment:		
Equipment Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95100
Project Title: Administration, Public Information and Science Management
Sub-Project: Restoration Work Force
Agency: National Ocea & Atmospheric Admin.

FORM 3B
SUB-PROJECT DETAIL

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

Project Description: This project is the closeout of 94102 - Murrelet Prey and Foraging Habitat in Prince William Sound. The purpose of the project was to identify prey species, locate foraging areas, determine foraging patterns from known nesting areas, and characterize important feeding habitat for marbled murrelets. FY95 costs are for analyzing data and writing the report for work conducted in FY94. A final report will be prepared for the peer-review process and presentation to the Trustee Council.

Budget Category:	1994 Project No. 94102 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$119.3	$55.5	$0.0	$55.5		
Travel	$4.0	$0.0	$0.0	$0.0		
Contractual	$71.8	$0.0	$0.0	$0.0		
Commodities	$10.3	$0.0	$0.0	$0.0		
Equipment	$8.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$213.4	$55.5	$0.0	$55.5	$0.0	
General Administration	$18.1	$8.3	$0.0	$8.3	$0.0	
Project Total	$231.5	$63.8	$0.0	$63.8	$0.0	
Full-time Equivalents (FTE)	2.7	1.1	0.0	1.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm	Project Leader, GS-11	4.0	$23.0		
	Wildlife Biologist, GS-9	4.0	$14.0		
	Wildlife Biologist, GS9	4.0	$14.0		
	Bio. Science Tech., GS-5	1.5	$4.5		
	Personnel Total	13.5	$55.5	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95102-CLO
Project Title: Closeout: Murrelet Prey & Foraging Habitat in PWS
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

07/14/93

1995

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Project Number: 95102-CLO
Project Title: Closeout: Murrelet Prey & Foraging Habitat in PWS
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

07/14/93

1995

Printed: 9/12/94 12:05 PM

Project Number: 95102-CLO
Project Title: Closeout: Murrelet Prey & Foraging Habitat in PWS
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This study is an extension of ongoing investigations of injury assessment of the Kenai River ecosystem with emphasis on productivity of sockeye salmon. This study will initiate a pilot restoration project using enclosures in Skilak Lake to provide an experimental design to determine possible restoration strategies. The enclosure studies will allow experimental manipulation of fish density and nutrients on a limited scale to determine the costs and benefits of larger scale programs, such as changing fry recruitment through escapement changed]s, or nutrient additions to simulate fish carcass decomposition.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$106.0	$106.0	$0.0	
Travel	$0.0	$0.0	$9.3	$9.3	$0.0	
Contractual	$0.0	$0.0	$206.7	$206.7	$0.0	
Commodities	$0.0	$0.0	$37.5	$37.5	$0.0	
Equipment	$0.0	$0.0	$15.0	$15.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$374.5	$374.5	$0.0	
General Administration	$0.0	$0.0	$30.4	$30.4	$0.0	
Project Total	$0.0	$0.0	$404.8	$404.8	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	2.5	2.5	0.0	

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95105

Project Title: Kenai River Ecosystem Restoration Pilot Enclosure Study

Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This study is an extension of ongoing investigations of injury assessment of the Kenai River ecosystem with emphasis on productivity of sockeye salmon. This study will initiate a pilot restoration project using enclosures in Skilak Lake to provide an experimental design to determine possible restoration strategies. The enclosure studies will allow experimental manipulation of fish density and nutrients on a limited scale to determine the costs and benefits of larger scale programs, such as changing fry recruitment through escapement changed]s, or nutrient additions to simulate fish carcass decomposition.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$0.0	$0.0	$78.0	$78.0	$0.0
Travel	$0.0	$0.0	$6.3	$6.3	$0.0
Contractual	$0.0	$0.0	$203.7	$203.7	$0.0
Commodities	$0.0	$0.0	$25.0	$25.0	$0.0
Equipment	$0.0	$0.0	$15.0	$15.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$328.0	$328.0	$0.0
General Administration	$0.0	$0.0	$26.0	$26.0	$0.0
Project Total	$0.0	$0.0	$353.9	$353.9	$0.0
Full-time Equivalents (FTE)		0.0	1.4	1.4	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
2 Fishery Biologist I			16.0	$72.0
Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	17.0	$78.0

Comment

94 Report 95 Interim 96 Field 95 Report

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95105

Project Title: Kenai River Ecosystem Restoration Pilot Enclosure Study

Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	6 RT Anchorage/Soldotna @ $0.1 + 16 days per diem for meetings and project supervision		$3.0
	4 RT Soldotna/Juneau @ $.55 + 7 days per diem		$3.3
	Travel Total	$0.0	$6.3
Contractual:			
Intrm	Freight		$0.5
	Analysis of water samples		$3.0
	Software licensing		$0.5
	Diving contracts for enclosure installation		$10.0
	Contract with Asit Mazumder, University of Montreal		$29.7
	Contract for sampling equipment fabrication and calibration. (This cost based on two bids already received)		$160.0
	Contractual Total	$0.0	$203.7

06/01/94

1995

Printed: 9/12/94 12:06 PM

Project Number: 95105
Project Title: Kenai River Ecosystem Restoration Pilot Enclosure Study
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Scientific supplies (nets, water bottles, sample bottles, formalin, alcohol. laboratory chemicals)		$5.0
Intrm	Office supplies (paper, toner, pens, etc)		$1.0
	Photo supplies		$1.0
	Foul weather gear		$1.0
	Groceries (6 people for 60 days @ $20/day)		$7.2
	Safety supplies (2 medical kits @$0.3, 2 oxygen bottles @ $0.15, 2 survival suits @ 0.35, etc)		$2.8
	Outboard fuel and oil		$2.0
	Outboard motor and radio maintenance and repair		$5.0
	Commodities Total	$0.0	$25.0
Equipment:			
Rept	One 18' boat		$3.0
Intrm	Two 40 horse power outboards @ $3.5		$7.0
	Two fry tow nets @ $2.5		$5.0
	Equipment Total	$0.0	$15.0

Project Number: 95105
Project Title: Kenai River Ecosystem Restoration Pilot Enclosure Study
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This study is an extension of ongoing investigations of injury assessment of the Kenai River ecosystem with emphasis on productivity of sockeye salmon. This study will initiate a pilot restoration project using enclosures in Skilak Lake to provide an experimental design to determine possible restoration strategies. The enclosure studies will allow experimental manipulation of fish density and nutrients on a limited scale to determine the costs and benefits of larger scale programs, such as changing fry recruitment through escapement changed]s, or nutrient additions to simulate fish carcass decomposition.

Budget Category:	1994 Project No. 94259 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$28.0	$28.0		
Travel	$0.0	$0.0	$3.0	$3.0		
Contractual	$0.0	$0.0	$3.0	$3.0		
Commodities	$0.0	$0.0	$12.5	$12.5		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$46.5	$46.5	$0.0	
General Administration	$0.0	$0.0	$4.4	$4.4	$0.0	
Project Total	$0.0	$0.0	$50.9	$50.9	$0.0	
Full-time Equivalents (FTE)		0.0	1.1	1.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept 2 NBS Bio. Technicians(GS-5)			12.0	$23.0
Intrm NBS Project Leader (GS-12)			1.0	$5.0
Personnel Total	0.0	$0.0	13.0	$28.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

Printed: 9/12/94 12:06 PM

Project Number: 95105
Project Title: Kenai River Ecosystem Restoration Pilot Enclosure Study
Sub-Project:
Agency: Dept. of Interior, National Biological Survey

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	6 RT Anchorage/Soldotna @$0.1 + 10 days per diem	$0.0	$3.0
Intrm			
	Travel Total	$0.0	$3.0
Contractual:			
Rept	GSA vehicle use 6 months @ $0.5/month	$0.0	$0.0
Intrm			$3.0
	Contractual Total	$0.0	$3.0

06/01/94

1995

Printed: 9/12/94 12:06 PM

Project Number: 95105
Project Title: Kenai River Ecosystem Restoration Pilot Enclosure Study
Sub-Project:
Agency: Dept. of Interior, National Biological Survey

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Sampling supplies (nets, water bottles, sample bottles, formalin, laboratory chemicals)	$0.0	$1.4
Intrm	Rain gear and boots for 3 people		$0.6
	Weatherport tent		$2.0
	Groceries for 2 people for 180 days		$7.2
	Safety equipment (survival suits @$0.3, medical kits, oxygen tanks		$1.3
	Commodities Total	$0.0	$12.5
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 9/12/94 12:06 PM

Project Number: 95105
Project Title: Kenai River Ecosystem Restoration Pilot Enclosure Study
Sub-Project:
Agency: Dept. of Interior, National Biological Survey

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: The subtidal eelgrass community was one of the several habitats examined relative to EVOS effects and subsequent recovery. Investigations comparing oiled and control sites in this habitat were conducted in 1990, 1991, and 1993. After the 1991 samplint it was apparent that recovery was underway. However, the 1993 data reveals a reversal, suggesting that some segments of the community are once again in a toxic phase (e.g., amphipods) and othr segments reflect enhancement (e.g., epifauna on eelgrass). This project will revisit eelgrass sites from earlier studies to monitor the recovery of the eelgrass communities. Since no sampling occurred in 1994, and since community recovery had not occurred through the 1993 sampling, it is advisable to reexamine these eelgrass sites again in 1995 to monitor their recovery.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 96 Field	95 Report
Personnel	$0.0	$0.0	$6.0	$6.0	$10.2	$6.0	$4.2
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$180.8	$180.8	$399.9	$180.8	$219.1
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$186.8	$186.8	$410.1	$186.8	$223.3
General Administration	$0.0	$0.0	$13.6	$13.6	$22.0	$13.6	$16.0
Project Total	$0.0	$0.0	$200.4	$200.4	$432.1	$200.4	$239.3
Full-time Equivalents (FTE)		0.0	0.1	0.1			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95106
Project Title: Subtidal Monitoring: Eelgrass Communities
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

			Reprt/Intrm	Remaining
Travel:				
Rept			$0.0	$0.0
Intrm				
		Travel Total	$0.0	$0.0
Contractual:				
RSA with UAF to conduct a monitoring study on the eelgrass communities of PWS.			$0.0	$180.8
The RSA line item breakout is as follows:				
100	$73.3			
200	$3.1			
300	$70.3	Includes subcontracts for vessel charter ($32.0) and CRA ($34.0).		
400	$4.0			
500	$0.0			
Subtotal	$150.7			
UAF General Admin.	$30.1			
RSA Total	$180.8			
		Contractual Total	$0.0	$180.8

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

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

07/14/93

1995

Printed: 9/12/94 12:07 PM

Project Number: 95106
Project Title: Subtidal Monitoring: Eelgrass Communities
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: This study is needed to test the ability to match oiled and control sites and to demonstrate that the site selection process produced no biases that may have resulted in inherent differences among oiled and control pairs.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
						95 Report
Personnel	$0.0	$0.0	$3.0	$3.0	$4.2	$4.2
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$49.3	$49.3	$34.7	$34.7
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$52.3	$52.3	$38.9	$38.9
General Administration	$0.0	$0.0	$3.9	$3.9	$3.1	$3.1
Project Total	$0.0	$0.0	$56.2	$56.2	$42.0	$42.0
Full-time Equivalents (FTE)		0.0	0.0	0.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95107
Project Title: Subtidal Site Verification
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept	$0.0	$0.0
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
RSA with UAF to test the ability to match oiled and control sites.	$0.0	$49.3
RSA line item breakout is as follows:		
100 $0.0		
200 $0.9		
300 $40.2		
400 $0.0		
500 $0.0		
Subtotal $41.1		
UAF General Admin $8.2		
RSA Total $49.3		
Contractual Total	$0.0	$49.3

Project Number: 95107
Project Title: Subtidal Site Verification
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

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

07/14/93

1995

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Project Number: 95107
Project Title: Subtidal Site Verification
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Closeout and report writing associated with project 94110, Habitat Protection Data Acquisition & Support. During FY 94, this project provided for field surveys, data collection and analysis necessary for the development and implementation of the comprehensive habitat protection process including large and small parcel evaluations.

Budget Category:	1994 Project No. 94110 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$249.7	$73.2	$0.0	$73.2	$0.0	Of the $143.9 requested, $84.0 represents
Travel	$22.9	$6.0	$0.0	$6.0	$0.0	funds previously authorized but not
Contractual	$333.6	$48.0	$0.0	$48.0	$0.0	expended, and $59.9 represents a request
Commodities	$10.7	$2.4	$0.0	$2.4	$0.0	for additional funding to closeout this project
Equipment	$1.0	$0.0	$0.0	$0.0	$0.0	and complete associated report writing.
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	This represents a significant reduction from
Subtotal	$617.9	$129.6	$0.0	$129.6	$0.0	the additional $144.5 projected as new
General Administration	$60.7	$14.4	$0.0	$14.4	$0.0	funding needs for FY 95 in the original proposal.
Project Total	$678.6	$144.0	$0.0	$144.0	$0.0	
Full-time Equivalents (FTE)	3.7	1.2	0.0	1.2	0.0	This is due in part to additional tasks being assigned to the project team causing a delay in the start of a major component of the project.
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95110-CLO

Project Title: Habitat Protection - Data Acquisition & Support

Agency: AK Dept. of Natural Resources

FORM 2A PROJECT DETAIL

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

Project Description: Habitat Protection - Data Acquisition & Support provides for field surveys, data collection and analysis necessary for the development and implementation of the comprehensive habitat protection process including large and small parcel evaluations.

Budget Category:	1994 Project No. 94110 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$109.5	$24.5	$0.0	$24.5	
Travel	$9.2	$3.0	$0.0	$3.0	
Contractual	$290.1	$48.0	$0.0	$48.0	
Commodities	$4.2	$1.5	$0.0	$1.5	
Equipment	$1.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	
Subtotal	$414.0	$77.0	$0.0	$77.0	$0.0
General Administration	$36.7	$7.0	$0.0	$7.0	$0.0
Project Total	$450.7	$84.0	$0.0	$84.0	$0.0
Full-time Equivalents (FTE)	1.4	0.3	0.0	0.3	
Dollar amounts are shown in thousands of dollars.					

Comment

This is a request for authorization to continue to expend funds which would lapse on September 30, 1994. In order to complete the tasks outlined in this proposal for 1994 it will be necessary to continue this project through the first quarter of FY 95. This is due in part to additional tasks being assigned to the project team causing a delay in the start of a major component of the project. This is not a request for additional funds. We request permission to expend an amount equivalent to funds lapsing.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm	Natural Resources Manager II	3.0	$21.0		
	Project Manager	0.5	$3.5		
	Personnel Total	3.5	$24.5	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel to PWS and GOA to survey and evaluate parcels for habitat protection	$3.0	
Travel Total	$3.0	$0.0
Contractual:		
Rept		
Intrm		
Map Production: Maps and Analyses for Small Parcel Analysis and Presentation	$30.0	
Aircraft charters for access to upland portions of parcels as negotiations refine parcel boundaries. (12 hours @ $250/hour)	$3.0	
Publication costs	$15.0	
Contractual Total	$48.0	$0.0

Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Office supplies	$0.5	
Computer software and upgrades	$0.5	
Plotter supplies including ink cartridges and special paper	$0.5	
Commodities Total	$1.5	$0.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: Habitat Protection - Data Acquisition & Support provides for field surveys, data collection and analysis necessary for the development and implementation of the comprehensive habitat protection process including large and small parcel evaluations.

Budget Category:	1994 Project No. 94110 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$69.9	$18.7	$0.0	$18.7		
Travel	$4.6	$1.0	$0.0	$1.0		
Contractual	$34.5	$0.0	$0.0	$0.0		
Commodities	$5.5	$0.3	$0.0	$0.3		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$114.5	$20.0	$0.0	$20.0	$0.0	
General Administration	$12.9	$2.8	$0.0	$2.8	$0.0	
Project Total	$127.4	$22.8	$0.0	$22.8	$0.0	
Full-time Equivalents (FTE)	1.0	0.3	0.0	0.3		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Habitat Biologist III	3.0	$18.7		
Personnel Total	3.0	$18.7	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to oil spill area to conduct evaluations of additional parcels	$1.0	
	Travel Total	$1.0	$0.0
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm Office supplies	$0.3	
Commodities Total	$0.3	$0.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

06/01/94

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Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: Habitat Protection - Data Acquisition & Support provides for field surveys, data collection and analysis necessary for the development and implementation of the comprehensive habitat protection process including large and small parcel evaluations.

Budget Category:	1994 Project No. 94110 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$36.8	$15.0	$0.0	$15.0		
Travel	$4.5	$1.0	$0.0	$1.0		
Contractual	$4.5	$0.0	$0.0	$0.0		
Commodities	$0.5	$0.3	$0.0	$0.3		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$46.3	$16.3	$0.0	$16.3	$0.0	
General Administration	$5.8	$2.3	$0.0	$2.3	$0.0	
Project Total	$52.1	$18.6	$0.0	$18.6	$0.0	
Full-time Equivalents (FTE)	0.6	0.3	0.0	0.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Biologist	3.0	$15.0		
Personnel Total	3.0	$15.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: Dept. of Agriculture, Forest Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to oil spill area to conduct additional evaluations	$1.0	
	Travel Total	$1.0	$0.0
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-
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DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Office supplies	$0.3	
	Commodities Total	$0.3	$0.0
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Habitat Protection - Data Acquisition & Support provides for field surveys, data collection and analysis necessary for the development and implementation of the comprehensive habitat protection process including large and small parcel evaluations.

Budget Category:	1994 Project No. 94110 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$33.5	$15.0	$0.0	$15.0		
Travel	$4.6	$1.0	$0.0	$1.0		
Contractual	$4.5	$0.0	$0.0	$0.0		
Commodities	$0.5	$0.3	$0.0	$0.3		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$43.1	$16.3	$0.0	$16.3	$0.0	
General Administration	$5.3	$2.3	$0.0	$2.3	$0.0	
Project Total	$48.4	$18.6	$0.0	$18.6	$0.0	
Full-time Equivalents (FTE)	0.7	0.3	0.0	0.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Biologist	3.0	$15.0		
Personnel Total	3.0	$15.0	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to oil spill area to conduct additional evaluations	$1.0	
	Travel Total	$1.0	$0.0
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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1995

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Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: Dept. of Interior, Fish & Wildlife Service

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PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Office supplies	$0.3	
	Commodities Total	$0.3	$0.0
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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1995

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Project Number: 95110-CLO
Project Title: Habitat Protection - Data Acquisition & Support
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: This project will use port sampling, EVOS study data, and survey performance data to describe the biological characteristics of the rockfish resource. Tagging studies will clarify stock movements and potential recruitment. The above mentioned information will be applied to a management plan which modifies human use to provide for long-term sustainable rockfish yield.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 96 Field	Comment 95 Report
Personnel	$0.0	$0.0	$133.3	$133.3	$201.6	$173.5	$28.1
Travel	$0.0	$0.0	$2.8	$2.8	$12.7	$10.5	$2.2
Contractual	$0.0	$0.0	$35.1	$35.1	$71.6	$64.6	$7.0
Commodities	$0.0	$0.0	$3.2	$3.2	$8.8	$8.0	$0.8
Equipment	$0.0	$0.0	$25.7	$25.7	$4.0	$4.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$200.1	$200.1	$298.7	$260.6	$38.1
General Administration	$0.0	$0.0	$22.5	$22.5	$35.3	$30.5	$4.7
Project Total	$0.0	$0.0	$222.6	$222.6	$334.0	$291.1	$42.8
Full-time Equivalents (FTE)		0.0	3.4	3.4			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rem 3 Fish & Wildlife Technician II	0.0	$0.0	24.0	$69.6
Lab Technician	0.0	$0.0	9.0	$29.1
Biometrician	0.0	$0.0	2.0	$10.0
Fishery Biologist II	0.0	$0.0	4.5	$20.4
Program Manager	0.0	$0.0	0.8	$4.2
Personnel Total	0.0	$0.0	40.3	$133.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95111
Project Title: Sustainable Rockfish Yield
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rem	2 RT Homer- Anchorage for winter meetings @ $0.2 + 6 days per diem ($0.9)		$1.3
	2 RT Homer- Cordova @ $0.3 + 2 days per diem ($0.3)		$0.9
	2 RT Homer-Seward using state vehicle + 2 days per diem ($0.3)		$0.3
	2 RT Homer-Seward using state vehicle + 2 days per diem ($0.3)		$0.3
	Travel Total	$0.0	$2.8
Contractual:			
Rem	Short-term vessel charter 3 trips X 7 days/trip @ $1.4/day		$29.4
	Long distance phone charges		$0.8
	Postage		$0.4
	Equipment repair		$1.0
	Vehicle lease for 5 months @ $0.5/month		$2.5
	Preparation of 4 camera ready copies and 32 bound copies		$1.0
	Contractual Total	$0.0	$35.1

Project Number: 95111
Project Title: Sustainable Rockfish Yield
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Commodities:		Reprt/Intrm	Remaining
Rem	Personal sampling gear for 4 people @ $0.325/person (Rain gear, gloves, float vests)		$1.3
	Scientific sampling supplies (Knives, forceps, tags, scale envelopes, etc.)		$1.0
	Office supplies (Paper, pens, etc.)		$0.4
	Fish scale ageing supplies		$0.5
	Commodities Total	$0.0	$3.2
Equipment:			
Rem	1 Microscope		$2.9
	1 Fiber optic light source		$0.8
	3 Mechanical jigging machines @ $4.0		$12.0
	1 Damping scale		$4.0
	2 Laptop computers @ $3.0 for data entry while in the field		$6.0
	Equipment Total	$0.0	$25.7

Project Number: 95111
Project Title: Sustainable Rockfish Yield
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: This project will use fishery performance and EVOS study data to describe the biological characteristics of the rockfish resource. It will use survey and fishery performance data to describe rockfish distribution and status. Based on these analyses, recommendations will be made on further monitoring and restoration activities.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$25.8	$25.8	$0.0	If funded as of January 1995, no additional FFY96 funds will be requested as work will be completed by September 30, 1995.
Travel	$0.0	$0.0	$3.0	$3.0	$0.0	
Contractual	$0.0	$0.0	$15.0	$15.0	$0.0	
Commodities	$0.0	$0.0	$3.0	$3.0	$0.0	
Equipment	$0.0	$0.0	$2.0	$2.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$48.8	$48.8	$0.0	
General Administration	$0.0	$0.0	$4.9	$4.9	$0.0	
Project Total	$0.0	$0.0	$53.7	$53.7	$0.0	
Full-time Equivalents (FTE)		0.0	0.5	0.5		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rem Biometrician I			2.0	$10.0
Fish and Wildlife Technician II (ageing)			3.0	$9.6
Fishery Biologist I (ageing trainer)			0.5	$2.0
Program Manager			0.8	$4.2
Personnel Total	0.0	$0.0	6.3	$25.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95112
Project Title: Rockfish Restoration Objective
Agency: AK Dept. of Fish & Game

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

		Reprt/Intrm	Remaining
Travel:			
Rem	3 RT Homer/Anchorage @ $0.2 + 8 days per diem for winter meetings		$1.8
	1 RT Homer/Juneau @ $0.6 + 4 days per diem		$1.2
	Travel Total	$0.0	$3.0
Contractual:			
Rem	Consultation with rockfish expert		$14.0
	Postage		$0.2
	Long distance phone charges		$0.4
	Equipment repair		$0.4
	Contractual Total	$0.0	$15.0

Project Number: 95112
Project Title: Rockfish Restoration Objective
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rem	Office supplies (paper, pencils, software)		$1.0
	Scientific supplies (scalpels, forceps, trays, labels)		$0.9
	Personal gear (rain suit, rubber boots)		$0.3
	Fiber optics light source		$0.8
	Commodities Total	$0.0	$3.0
Equipment:			
Rem	Microscope for ageing fish		$2.0
	Equipment Total	$0.0	$2.0

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1995

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Project Number: 95112
Project Title: Rockfish Restoration Objective
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Stable isotope analysis of eelgrass community samples collected in conjunction with an eelgrass community monitoring project under the direction of S.C Jewett (UAF). Taxa include fishes, epifauna (mollusks, amphipods, isopods, helmet crabs) and infauna (clams, polychaetes, other worms). Stable isotope data will be used to determine trophic position and food web relationships among species sampled in oiled and unoiled habitats following a set design (Jewett Proposal) and to provide associated projects (marine mammals, birds) the isotopic database required for data interpretation isotopic analyses will also be integrated into the energetics and modeling studies.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$48.3	$0.0	$3.0	$3.0	$3.0	
Travel	$5.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$4.0	$0.0	$132.4	$132.4	$53.5	
Commodities	$0.7	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$58.0	$0.0	$135.4	$135.4	$56.5	
General Administration	$0.0	$0.0	$9.7	$9.7	$4.2	
Project Total	$58.0	$0.0	$145.1	$145.1	$60.7	
Full-time Equivalents (FTE)	0.7	0.0	0.0	0.0		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Intrm Rem Program Manager	0.0	$0.0	0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95114
Project Title: Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm		$0.0	$0.0
	Travel Total	$0.0	$0.0
Contractual:			
Intrm			
Intrm	Contract with UAF to conduct this project	$0.0	$132.4
Intrm			
	Contractual Total	$0.0	$132.4

Project Number: 95114
Project Title: Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers
Agency: AK Dept. of Fi[illegible] & Game

FORM 2B
PROJECT
DETAIL

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

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

Project Number: 95114
Project Title: Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Stable isotope analysis of eelgrass community samples collected in conjunction with an eelgrass community monitoring project under the direction of S.C Jewett (UAF). Taxa include fishes, epifauna (mollusks, amphipods, isopods, helmet crabs) and infauna (clams, polychaetes, other worms). Stable isotope data will be used to determine trophic position and food web relationships among species sampled in oiled and unoiled habitats following a set design (Jewett Proposal) and to provide associated projects (marine mammals, birds) the isotopic database required for data interpretation isotopic analyses will also be integrated into the energetics and modeling studies.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$48.3	$0.0	$34.4	$34.4	$34.0	
Travel	$5.0	$0.0	$1.8	$1.8	$7.1	
Contractual	$4.0	$0.0	$33.0	$33.0	$1.5	
Commodities	$0.7	$0.0	$6.0	$6.0	$2.0	
Equipment	$0.0	$0.0	$35.1	$35.1	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$58.0	$0.0	$110.3	$110.3	$44.6	
General Administration	$0.0	$0.0	$22.1	$22.1	$8.9	
Project Total	$58.0	$0.0	$132.4	$132.4	$53.5	
Full-time Equivalents (FTE)	0.7	0.0	0.7	0.7		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm	Principal Investigator	0.0	$0.0	5.0	$23.3
Intrm	Technician	0.0	$0.0	3.0	$11.1
Rem					
	Personnel Total	0.0	$0.0	8.0	$34.4

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95114
Project Title: Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers
Agency: University of Ala[illegible] Fairbanks

FORM 3B SUB-PROJECT [illegible]AIL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	1 RT Cordova/Anchorage @ $200 + 5 days per diem @ $170 for winter workshop	$0.0	$1.1
	Cruise Cordova/Seward @ $300 + 3 days per diem @ $147	$0.0	$0.7
	Travel Total	$0.0	$1.8
Contractual:			
	Isotope ratio mass spectrometer charges 2000 @ $15	$0.0	$30.0
	Shipping, report prep, copying, communications, computer maintenance	$0.0	$1.5
	Diving physicals	$0.0	$1.5
	Contractual Total	$0.0	$33.0

Project Number: 95114
Project Title: Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers
Agency: University of Alaska - Fairbanks

FORM 3B
SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
	Field supplies (whirl pacs, plastic bags, sampling jars, scalpels, exposure suits)	$0.0	$3.0
Intrm	Lab/office supplies(vials, lab glassware, chemicals, stationery)	$0.0	$2.0
	Software updates	$0.0	$0.2
	Statistical package	$0.0	$0.8
	Commodities Total	$0.0	$6.0
Equipment:			
Rept	Stoppering tray freeze dryer with isolation valve(Sample prep)	$0.0	$19.0
Intrm	Top load, 0.1 mg resolution, balance (sample prep)	$0.0	$2.0
	Micro-sample homogenizer (dental amalgamator) (sample prep)	$0.0	$1.5
	Dry mill, 1 liter capacity, self cleaning blade, moderate duty (sample prep)	$0.0	$7.8
	CRT for Data processing	$0.0	$0.6
	2 Gb hard drive for data processing	$0.0	$1.2
	CPU for data processing	$0.0	$3.0
	Equipment Total	$0.0	$35.1

Project Number: 95114
Project Title: Eelgrass Community Structure Restoration Assessment Using Stable Isotope Tracers
Agency: University of Alaska - Fairbanks

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will explore various options for regional management of waste oil, associated toxics and solid waste. This project is intended to reduce the pollutants introduced into the environment injured by the *Exxon Valdez* oil spill so that natural recovery may proceed as quickly as possible.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$12.8	$12.8	$36.0	
Travel	$0.0	$0.0	$6.0	$6.0	$7.2	
Contractual	$0.0	$0.0	$211.1	$211.1	$14.9	
Commodities	$0.0	$0.0	$1.0	$1.0	$2.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$230.9	$230.9	$60.1	
General Administration	$0.0	$0.0	$16.7	$16.7	$6.4	
Project Total	$0.0	$0.0	$247.6	$247.6	$66.5	
Full-time Equivalents (FTE)	0.0	0.0	0.2	0.2	0.4	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Restoration Specialist (R-23)	0.0	$0.0	1.0	$6.9
Restoration Specialist	0.0	$0.0	1.0	$5.9
Personnel Total	0.0	$0.0	2.0	$12.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95115
Project Title: Sound Waste Management Plan
Agency: AK Dept. of Environmental Conservation

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Juneau to Anchorage and PWS ($450/trip + 2 days per diem @ $150/day x 8 trips)	$0.0	$6.0
Travel Total	$0.0	$6.0
Contractual:		
Long distance phone and fax	$0.0	$1.0
Mail and courier	$0.0	$0.8
Copying and printing	$0.0	$2.0
Freight and cartage	$0.0	$0.2
Plane/helicopter charter to Prince William Sound communities	$0.0	$2.0
Film processing	$0.0	$0.1
Contract for consultant to develop regional waste Management Plan	$0.0	$175.0
RSA with Prince William Sound Development Council to manage contract	$0.0	$30.0
Contractual Total	$0.0	$211.1

Project Number: 95115
Project Title: Sound Waste Management Plan
Agency: AK Dept. of Environmental Conservation

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Office supplies	$0.0	$0.6
Computer supplies	$0.0	$0.4
Commodities Total	$0.0	$1.0
Equipment:		
Equipment Total	$0.0	$0.0

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Project Number: 95115
Project Title: Sound Waste Management Plan
Agency: AK Dept. of Environmental Conservation

FORM 2B
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DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description:

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$48.6	$48.6		
Travel	$0.0	$0.0	$7.2	$7.2		
Contractual	$0.0	$0.0	$23.2	$23.2		
Commodities	$0.0	$0.0	$3.8	$3.8		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$82.8	$82.8	$0.0	
General Administration	$0.0	$0.0	$8.9	$8.9	$0.0	
Project Total	$0.0	$0.0	$91.7	$91.7	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.7	0.7		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Restoration Specialist (R-23)	0.0	$0.0	5.0	$34.4
Restoration Specialist (R-18)	0.0	$0.0	3.0	$14.2
Personnel Total	0.0	$0.0	8.0	$48.6

NEPA Cost: $5.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95116
Project Title: Mussel Bed Restoration With PES-51
Agency: AK Dept. of Environmental Conservation

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Juneau to Anchorage ($450/trip + 3 days per diem @ $150/day x 8 trips)	$0.0	$7.2
Travel Total	$0.0	$7.2
Contractual:		
Long distance phone and fax	$0.0	$2.5
Mail and courier	$0.0	$0.8
Copying and printing	$0.0	$2.0
Freight and cartage	$0.0	$0.5
Plane/helicopter charter to restoration site and nearby communities	$0.0	$15.0
Risk management	$0.0	$2.0
Film processing	$0.0	$0.4
Contract to carry out mussel bed restoration and monitoring	$0.0	
Contractual Total	$0.0	$23.2

Project Number: 95116
Project Title: Mussel Bed Restoration With PES-51
Agency: AK Dept. of Environmental Conservation

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PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Office supplies	$0.0	$1.0
Computer supplies	$0.0	$1.0
Film/photographic supplies/video tape	$0.0	$0.8
Sampling equipment	$0.0	$0.5
Survival and safety equipment < $500	$0.0	$0.5
Commodities Total	$0.0	$3.8
Equipment:		
Equipment Total	$0.0	$0.0

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1995

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Project Number: 95116
Project Title: Mussel Bed Restoration With PES-51
Agency: AK Dept. of Environmental Conservation

FORM 2B
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DETAIL

EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: 95117-BAA Harbor Seals and EVOS: Blubber and Lipids as Indices of Food Limitation

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$39.3	$39.3	$35.9	
Travel		$0.0	$5.1	$5.1	$3.1	
Contractual		$0.0	$7.7	$7.7	$7.7	
Commodities		$0.0	$3.5	$3.5	$2.4	
Equipment		$0.0	$12.3	$12.3	$0.0	
Indirect Costs (41.8% minus equipment and t		$0.0	$0.0	$20.1	$19.5	
Subtotal	$0.0	$0.0	$67.9	$88.0	$68.6	
General Administration		$0.0	$6.4	$6.4	$5.9	
Project Total	$0.0	$0.0	$74.3	$94.4	$74.5	
Full-time Equivalents (FTE)		0.0	1.0	1.0		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Manager, NOAA			1.0	$5.0
Principal Investigator			2.0	$9.5
2 Research Associates			9.0	$14.5
Leave Accrual				$3.4
Benefits				$6.9
Personnel Total	0.0	$0.0	12.0	$39.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

Project Number: 95117-BAA
Project Title: Harbor Seal Blubber and Lipids
Agency: Institute of Marine Science, UAF

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PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	4RT Fairbanks/Anchorage @ $375		$1.5
	EVOS Workshop - Per diem in Anchorage (14 days @ $170/days)		$2.4
	Sample Collection - per diem in Anchorage (7 days @ $170/day)		$1.2
	Travel Total	$0.0	$5.1
Contractual:			
Rept			
Intrm	Bomb Calorimetry (175 samples @ $20)		$3.5
	Phone		$0.5
	Postage		$0.2
	Cargo Shipping		$1.0
	Student Aid, 1 semester		$2.5
	Contractual Total	$0.0	$7.7
Commodities:		**Reprt/Intrm**	**Remaining**

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1995

Project Number: 95117-BAA
Project Title: Harbor Seal Blubber and Lipids
Agency: Institute of Marine Science, UAF

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Rept Intrm	Organic solvents (lipid extraction)		$0.5
	Soxhlet glassware (5 @ $225)		$1.1
	Extraction expendables		$0.4
	Freezer inventory supplies		$0.5
	Computer supplies		$1.0
	Commodities Total	$0.0	$3.5
Equipment:			
Rept Intrm	Sample shipper		$1.0
	Soxhlet heater		$1.0
	Density meter		$10.0
	Shipping cost for above items		$0.3
	Equipment Total	$0.0	$12.3

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1995

Project Number: 95117-BAA
Project Title: Harbor Seals Blubber and Llpids
Agency: Institute of Marine Science, UAF

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: 95118-BAA Diet Composition, Reproductive Energetics, and Productivity of Seabirds Damaged by the *Exxon Valdez* Oil Spill

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$45.7	$45.7	$51.1	
Travel		$0.0	$4.7	$4.7	$7.7	
Contractual		$0.0	$24.6	$24.6	$22.4	
Commodities		$0.0	$17.8	$17.8	$14.5	
Equipment		$0.0	$0.0	$0.0	$0.0	
Indirect Costs (41.8%, less tuition and equip		$0.0	$0.0	$39.2	$39.2	
Subtotal	$0.0	$0.0	$92.8	$132.0	$134.9	
General Administration		$0.0	$8.6	$8.6	$9.2	
Project Total	$0.0	$0.0	$101.4	$140.6	$144.1	
Full-time Equivalents (FTE)		0.0	1.7	1.7		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Manager, NOAA			1.0	$5.0
Graduate Student, Ph.D.			6.0	$15.9
Field Technician			4.0	$8.1
Lab Technician			9.0	$16.7
Personnel Total	0.0	$0.0	20.0	$45.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95118-BAA
Project Title: Diet and Energetics of Seabirds
Agency: Cooperative Fish & Wildlife Research Unit, UAf

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Presentation at National Meeting - 2 RT		
	4RT Fairbanks/Valdez @ $330/trip		$1.3
	Per diem for volunteer, $300/mo x 2		$2.4
	2 RT Fairbanks/Anchorage for workshop		$1.0
	Travel Total	$0.0	$4.7
Contractual:	Tuition		$2.6
Rept	Telephone services		$0.4
Intrm	Duplication/computer fees		$0.5
	Excess baggage		$0.3
	Publication - page charges, reports		$0.5
	Lease Porta-shelter		$1.4
	Lease - optical equipment		$0.5
	Boat Charter		$9.0
	Vehical rental		$0.8
	Lease Zodiac		$0.8
	Lab equipment maintenance		$3.0
	Lease - battery top-loading balance		$1.0
	Lease computer		$1.8
	Lease HP 100 LX Palmtop		$1.2
	Lease boat motor		$0.8
	Contractual Total	$0.0	$24.6

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Project Number: 95118-BAA
Project Title: Diet and Energetics of Seabirds
Agency: Cooperative Fish & Wildlife Unit, UAF

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Commodities:	Printed: 9/12/94 12:14 PM	Reprt/Intrm	Remaining

Rept Intrm	Chemicals		$3.0
	Chroma rods		$0.6
	Thimbles, extraction		$0.5
	Lab Supplies/analysis		$4.5
	food		$4.0
	Sleeping bags		$1.0
	scales		$0.4
	sample bags		$0.2
	tents		$0.6
	miscellaneous camp supplies		$0.6
	climbing equipment		$2.4
	Commodities Total	$0.0	$17.8
Equipment:			
Rept Intrm			
	Equipment Total	$0.0	$0.0

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1995

Project Number: 95118-BAA
Project Title: Diet and Energetics of Seabirds
Agency: Cooperative Fish and Wildlife Research Unit, UAF

FORM 2B
PROJECT
DETAIL

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: 95120-BAA Proximate Composition and Energetic Content of Selected Forage Fish Species in Prince William Sound

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$20.5	$20.5	$15.5	
Travel		$0.0	$3.0	$3.0	$3.0	
Contractual		$0.0	$0.0	$0.0	$0.0	
Commodities		$0.0	$3.5	$3.5	$3.5	
Equipment		$0.0	$1.0	$1.0	$0.0	
Indirect costs (45%)		$0.0	$0.0	$11.9	$11.5	
Subtotal	$0.0	$0.0	$28.0	$39.9	$33.5	
General Administration		$0.0	$3.1	$3.1	$2.3	
Project Total	$0.0	$0.0	$31.1	$43.0	$35.8	
Full-time Equivalents (FTE)		0.0	0.1	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Manager, NOAA			1.0	$5.0
Personnel				$15.5
Personnel Total	0.0	$0.0	1.0	$20.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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1995

Project Number: 95120-BAA
Project Title: Energetic content of Forage Fish
Agency: Texas A&M University

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel		$3.0
	Travel Total	$0.0	$3.0
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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1995

Project Number: 95120-BAA
Project Title: Energetic Content of Forage Fish
Agency: Texas A&M University

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Commodities:		Reprt/Intrm	Remaining

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Rept Intrm	Commodities		$3.5
	Commodities Total	$0.0	$3.5
Equipment:			
Rept Intrm	equipment		$1.0
	Equipment Total	$0.0	$1.0

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1995

Project Number: 95120-BAA
Project Title: Energetic content of Forage fish
Agency: Texas A&M University

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PROJECT
DETAIL

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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

Project Description: 95121 - Stable Isotope Ratios and Fatty Acid Signatures of Selected Forage Fish Species in Prince William Sound

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$17.3	$17.3	$4.0	
Travel		$0.0	$4.0	$4.0	$1.0	
Contractual		$0.0	$9.1	$9.1	$1.3	
Commodities		$0.0	$1.5	$1.5	$0.5	
Equipment		$0.0	$0.0	$0.0	$0.0	
Indirect Costs (45%)		$0.0	$0.0	$13.0	$4.0	
Subtotal	$0.0	$0.0	$31.9	$44.9	$10.8	
General Administration		$0.0	$3.2	$3.2	$0.7	
Project Total	$0.0	$0.0	$35.1	$48.1	$11.5	
Full-time Equivalents (FTE)		0.0	0.1	0.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Manager, NOAA			1.0	$5.0
Personnel				$12.3
Personnel Total	0.0	$0.0	1.0	$17.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95121
Project Title: Stable Isotope Ratios of Forage Fish
Agency: Texas A&M University

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PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1994 Federal Fiscal Year Project Budget
October 1, 1993 - September 30, 1994

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel		$4.0
	Travel Total	$0.0	$4.0
Contractual:			
Rept			
Intrm	Contractual services		$9.1
	Contractual Total	$0.0	$9.1
Commodities:		**Reprt/Intrm**	**Remaining**

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Project Number: 95121
Project Title: Stable Isotope Ratios in Forage Fish
Agency: Texas A&M University

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DETAIL

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Rept Intrm	Commodities		$1.5
	Commodities Total	$0.0	$1.5
Equipment:			
Rept Intrm	Equipment		$0.0
	Equipment Total	$0.0	$0.0

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1995

Project Number: 95121
Project Title: Stable Isotope Ratios in Forage Fish
Agency: Texas A&M University

FORM 2B
PROJECT
DETAIL

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This study is an extension of work conducted by USFWS and USFS as project 93501B. This proposal would be an operation application of conceptual and quantitative models. These models would be linked to geographic databases of vegetation and physical site characteristics in the identification of potential nesting habitat of marbled murrelet in PWS. Map outputs will provide state-of-science means for evaluating habitat protection or acquisition options for marbled murrelets or other species whose potential habitat can be specified based on vegetation and landscape features.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$83.5	$83.5		
Travel		$0.0	$1.5	$1.5		
Contractual		$0.0	$60.0	$60.0		
Commodities		$0.0	$4.5	$4.5		
Equipment		$0.0	$3.0	$3.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$152.5	$152.5	$0.0	
General Administration		$0.0	$16.7	$16.7	$0.0	
Project Total	$0.0	$0.0	$169.2	$169.2	$0.0	
Full-time Equivalents (FTE)		0.0	1.5	1.5		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm	Ecologist (GS12)	0.0	$0.0	6.0	$33.0
	Wildlife Biologist	0.0	$0.0	1.0	$5.5
	Ecologist (GS9)	0.0	$0.0	2.0	$8.0
	Biotech (GS7) (2)	0.0	$0.0	6.0	$18.0
	Program Manager	0.0	$0.0	0.5	$2.5
	Analyst (GS12)	0.0	$0.0	3.0	$16.5
	Personnel Total	0.0	$0.0	18.5	$83.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95122
Project Title: Marbled Murrelet Habitat Model
Agency: USDA Forest Service

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Over land		$1.5
Travel Total	$0.0	$1.5
Contractual:		
Rept		
Intrm		
Boat Charter, 60 days at $1,000 per day		$60.0
Contractual Total	$0.0	$60.0

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1995

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Project Number: 95122
Project Title: Marbled Murrelet Habitat Model
Agency: USDA Forest Service

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PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Office supplies, field books		$1.0
Field food		$3.5
Commodities Total	$0.0	$4.5
Equipment:		
Rept		
Intrm		
Air photos, GPS unit, camera, camping gear		$3.0
Equipment Total	$0.0	$3.0

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1995

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Project Number: 95122
Project Title: Marbled Murrelet Habitat Model
Agency: USDA Forest Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Habitat Protection and Acquisition Support - This project is a continuation of project 94126, Habitat Protection and Acquisition Fund. This project fund provides for the acquisition of rights for habitat protection on lands which will contribute to the restoration of resources and associated services injured by the Exxon Valdez oil spill. This project also provides for the activities necessary to obtain information such as appraisals, preliminary and final title reports, litigation reports, hazardous materials surveys, secondary parcel/package analysis and reconfiguration and on site verification necessary for the Trustee Council to reach closure on habitat protection actions.

Budget Category:	1994 Project No. 94126 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
				*TBD	*TBD	*The dollar amount for capital outlay is to be determined (TBD) based on Trustee Council actions.
Personnel	$235.4	$175.4	$188.1	$363.5	$0.0	
Travel	$57.4	$28.3	$23.5	$51.8	$0.0	
Contractual	$789.5	$359.4	$212.7	$572.1	$0.0	
Commodities	$0.7	$8.7	$7.5	$16.2	$0.0	
Equipment	$0.0	$3.0	$0.0	$3.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$1,083.0	$574.8	$431.8	$1,006.6	$0.0	
General Administration	$77.3	$51.4	$41.5	$92.9	$0.0	
Project Total	$1,160.3	$626.2	$473.3	$1,099.5	$0.0	
Full-time Equivalents (FTE)	4.0	2.6	3.3	5.9	0.0	

Dollar amounts are shown in thousands of dollars.

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

NEPA costs for acquisition of individual parcel property rights will be determined for each property when it is identified.

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Natural Resources

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Habitat Protection and Acquisition Support - This project is a continuation of project 94126, Habitat Protection and Acquisition Fund. This project fund provides for the acquisition of rights for habitat protection on lands which will contribute to the restoration of resources and associated services injured by the Exxon Valdez oil spill. This project also provides for the activities necessary to obtain information such as appraisals, preliminary and final title reports, litigation reports, hazardous materials surveys, secondary parcel/package analysis and reconfiguration and on site verification necessary for the Trustee Council to reach closure on habitat protection actions.

Budget Category:	1994 Project No. 94126 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
				*TBD	*TBD	*The dollar amount for capital outlay is to be determined (TBD) based on Trustee Council actions.
Personnel	$25.2	$28.0	$21.0	$49.0		
Travel	$12.7	$3.0	$2.3	$5.3		
Contractual	$182.4	$129.0	$64.0	$193.0		
Commodities	$0.0	$1.5	$2.0	$3.5		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$220.3	$161.5	$89.3	$250.8	$0.0	
General Administration	$16.5	$13.2	$7.6	$20.8	$0.0	
Project Total	$236.8	$174.7	$96.9	$271.6	$0.0	
Full-time Equivalents (FTE)	0.3	0.3	0.3	0.6		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	Comment
Rept Intrm					
Natural Resources Manager II	3.0	$21.0	3.0	$21.0	NEPA costs for acquisition of individual parcel property rights will be determined for each property when it is identified.
Project Manager	1.0	$7.0			
Personnel Total	4.0	$28.0	3.0	$21.0	

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel to Prince William Sound and Gulf of Alaska for purposes of conducting secondary parcel evaluations, appraisals, and on site negotiations and inspections. ($300 airfare + 3.5 days per diem @ $100/day - 5 trips)	$2.0	$1.3
Anchorage to Juneau travel to brief Trustee Council members, Executive Director, and/or negotiators. ($450 airfare + 3.5 days per diem @ $160/day - 2 trips	$1.0	$1.0
Travel Total	$3.0	$2.3
Contractual:		
Rept		
Intrm		
Printing and Map Production, Maps and Analyses for Negotiators	$45.0	$30.0
Aircraft Charters for access to upland portions of parcels as negotiations refine parcel boundaries. (8 hours @ $250/hour)	$1.0	$1.0
Services necessary to enable the Trustee Council to close purchase agreements for parcels under negotiation. This may include: title reports, litigation reports, appraisal review, and hazardous materials surveys.	$80.0	$30.0
Briefing Documents, Presentations	$3.0	$3.0
Contractual Total	$129.0	$64.0

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3B SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
Office Supplies and field equipment (water proof paper, toner cartridges, dividers, binders)	$0.5	$1.0
Computer Supplies, Software and Upgrades	$0.5	$0.5
Plotter supplies including ink cartridges, and special large format plotter paper.	$0.5	$0.5
Commodities Total	$1.5	$2.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Habitat Protection and Acquisition Support - This project is a continuation of project 94126, Habitat Protection and Acquisition Fund. This project fund provides for the acquisition of rights for habitat protection on lands which will contribute to the restoration of resources and associated services injured by the Exxon Valdez oil spill. This project also provides for the activities necessary to obtain information such as appraisals, preliminary and final title reports, litigation reports, hazardous materials surveys, secondary parcel/package analysis and reconfiguration and on site verification necessary for the Trustee Council to reach closure on habitat protection actions.

Budget Category:	1994 Project No. 94126 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
				*TBD	*TBD	*The dollar amount for capital outlay is to be determined (TBD) based on Trustee Council actions.
Personnel	$37.4	$44.2	$46.8	$91.0		
Travel	$33.0	$12.0	$12.0	$24.0		
Contractual	$515.0	$202.0	$80.0	$282.0		
Commodities	$0.0	$2.0	$2.0	$4.0		
Equipment	$0.0	$3.0	$0.0	$3.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$585.4	$263.2	$140.8	$404.0	$0.0	
General Administration	$28.4	$20.8	$11.0	$31.8	$0.0	
Project Total	$613.8	$284.0	$151.8	$435.8	$0.0	
Full-time Equivalents (FTE)	0.6	0.8	0.8	1.6		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	
Rept Intrm Negotiator	2.0	$8.8	4.0	$17.6	
Appraiser	3.0	$13.2	3.0	$13.2	NEPA costs for acquisition of individual parcel property rights will be determined for each property when it is identified.
Habitat Biologist	3.0	$16.0	3.0	$16.0	
Project Manager	1.0	$6.2			
Personnel Total	9.0	$44.2	10.0	$46.8	NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Agriculture, Forest Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept Intrm	Travel to Prince William Sound and Gulf of Alaska for purposes of conducting secondary parcel evaluations, appraisals, and on site negotiations and inspections. ($300 airfare + 3.5 days per diem @ $160/day - 25 trips)	$11.0	$11.0
	Anchorage to Juneau travel to brief Trustee Council members, Executive Director, and/or negotiators. ($450 airfare + 4 days per diem @ $160/day - 2 trips	$1.0	$1.0
	Travel Total	$12.0	$12.0
Contractual:			
Rept Intrm	Air charters for parcel surveys. (8 hours @ $250/hour)	$2.0	
	Appraisals which may need to be completed in FY95, due to uncertainty in negotiations. This may include 1 large parcel recently identified as well as any small parcels the Tustee Council may wish to approve. In addition, timber cruises may be required of additional large parcels.	$200.0	$80.0
	Contractual Total	$202.0	$80.0

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Computer software and upgrades, toner cartridges, data cartridges and supplies.	$1.0	$1.0
	Office supplies and field equipment (waterproof paper, pens batteries, film and processing)	$1.0	$1.0
	Commodities Total	$2.0	$2.0
Equipment:			
Rept			
Intrm			
	Computer hardware upgrade.	$3.0	
	Equipment Total	$3.0	$0.0

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Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Agriculture, Forest Service

FORM 3B
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DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Habitat Protection and Acquisition Support - This project is a continuation of project 94126, Habitat Protection and Acquisition Fund. This project fund provides for the acquisition of rights for habitat protection on lands which will contribute to the restoration of resources and associated services injured by the Exxon Valdez oil spill. This project also provides for the activities necessary to obtain information such as appraisals, preliminary and final title reports, litigation reports, hazardous materials surveys, secondary parcel/package analysis and reconfiguration and on site verification necessary for the Trustee Council to reach closure on habitat protection actions.

Budget Category:	1994 Project No. 94126 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
				*TBD	*TBD	*The dollar amount for capital outlay is to be determined (TBD) based on Trustee Council actions.
Personnel	$135.8	$57.2	$102.3	$159.5		
Travel	$9.7	$7.3	$7.2	$14.5		
Contractual	$92.1	$26.4	$67.7	$94.1		
Commodities	$0.7	$2.7	$2.0	$4.7		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$238.3	$93.6	$179.2	$272.8	$0.0	
General Administration	$26.8	$10.4	$20.1	$30.5	$0.0	
Project Total	$265.1	$104.0	$199.3	$303.3	$0.0	
Full-time Equivalents (FTE)	2.6	0.8	1.9	2.7		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Negotiator and Realty Assistant	3.0	$23.3	9.0	$34.7
Intrm	Biologist	3.0	$15.0	3.0	$15.0
	Mapper	2.0	$8.4	2.5	$10.6
	Hydrologist and Solicitor	0.2	$0.5	2.4	$5.9
	Reviewer	0.2	$1.8	3.2	$29.0
	Contaminants Specialist and Pilot	0.2	$3.2	0.3	$0.5
	Surveyor	0.2	$1.7		
	Biologist	1.0	$3.3	2.0	$6.6
	Personnel Total	9.8	$57.2	22.4	$102.3

NEPA costs for acquisition of individual parcel property rights will be determined for each property when it is identified.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	Travel to Kodiak for negotiations and site evaluations		
	11 Round Trips to Kodiak @ $386/trip = 90 days per diem @ $132/day	$4.0	$4.2
	Flight time for FLOS refuge plane for inspections and meeting with owners (11 hours @ $140/hour)	$0.5	$1.0
	Travel to Prince William Sound and Gulf of Alaska to conduct secondary parcel evaluations and site inspections. ($300 airfare + 3.5 days per diem @ $100/day - 6 trips)	$2.0	$2.0
	Travel to Juneau to brief negotiators, Trustee Council and Executive Director ($450 airfare + 3 days per diem @ $150/day - 1 trip)	$0.8	
	Travel Total	$7.3	$7.2
Contractual:			
Rept			
Intrm			
	Air charters for confirmation of parcel evaluations. (8 hours @ $250/hour)	$1.0	$1.0
	Title company to identify title deficiencies and insure title	$6.0	$35.0
	Surveys	$15.7	$28.0
	Air charters for negotiations support (25 hours fixed wing aircraft @ $300/hour)	$3.7	$3.7
	Contractual Total	$26.4	$67.7

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
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DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Computer software and upgrades, toner cartridges, data cartridges and supplies.	$1.0	$1.0
	Office supplies and field equipment (waterproof paper, pens batteries, film and processing)	$1.0	$1.0
	Field supplies	$0.7	
	Commodities Total	$2.7	$2.0
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Habitat Protection and Acquisition Support - This project is a continuation of project 94126, Habitat Protection and Acquisition Fund. This project fund provides for the acquisition of rights for habitat protection on lands which will contribute to the restoration of resources and associated services injured by the Exxon Valdez oil spill. This project also provides for the activities necessary to obtain information such as appraisals, preliminary and final title reports, litigation reports, hazardous materials surveys, secondary parcel/package analysis and reconfiguration and on site verification necessary for the Trustee Council to reach closure on habitat protection actions.

Budget Category:	1994 Project No. 94126 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
				*TBD	*TBD	*The dollar amount for capital outlay is to be determined (TBD) based on Trustee Council actions.
Personnel	$28.0	$28.0	$0.0	$28.0		
Travel	$2.0	$2.0	$0.0	$2.0		
Contractual	$0.0	$0.0	$0.0	$0.0		
Commodities	$0.0	$0.0	$0.0	$0.0		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$30.0	$30.0	$0.0	$30.0	$0.0	
General Administration	$4.2	$4.2	$0.0	$4.2	$0.0	
Project Total	$34.2	$34.2	$0.0	$34.2	$0.0	
Full-time Equivalents (FTE)	0.4	0.4	0.0	0.4		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	Comment
Rept Intrm Realty Officer	2.0	$12.0			
Negotiator	2.0	$10.0			NEPA costs for acquisition of individual parcel property rights will be determined for each property when it is identified.
Review Appraiser	1.0	$6.0			
Personnel Total	5.0	$28.0	0.0	$0.0	NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Interior, National Park Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	5 trips to Kenai Peninsula @ $400 per trip, including airfare and per diem	$2.0	
	Travel Total	$2.0	$0.0
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Interior, National Park Service

FORM 3B
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: Dept. of Interior, National Park Service

FORM 3B
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DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Habitat Protection and Acquisition Support - This project is a continuation of project 94126, Habitat Protection and Acquisition Fund. This project fund provides for the acquisition of rights for habitat protection on lands which will contribute to the restoration of resources and associated services injured by the Exxon Valdez oil spill. This project also provides for the activities necessary to obtain information such as appraisals, preliminary and final title reports, litigation reports, hazardous materials surveys, secondary parcel/package analysis and reconfiguration and on site verification necessary for the Trustee Council to reach closure on habitat protection actions.

Budget Category:	1994 Project No. 94126 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$9.0	$18.0	$18.0	$36.0		
Travel	$0.0	$4.0	$2.0	$6.0		
Contractual	$0.0	$2.0	$1.0	$3.0		
Commodities	$0.0	$2.5	$1.5	$4.0		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$9.0	$26.5	$22.5	$49.0	$0.0	
General Administration	$1.4	$2.8	$2.8	$5.6	$0.0	
Project Total	$10.4	$29.3	$25.3	$54.6	$0.0	
Full-time Equivalents (FTE)	0.1	0.3	0.3	0.6		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Habitat Biologist	3.0	$18.0	3.0	$18.0
Personnel Total	3.0	$18.0	3.0	$18.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept Intrm	Travel to Prince William Sound and Gulf of Alaska for purposes of conducting secondary parcel evaluations, appraisals, and on site negotiations and inspections. ($300 airfare + 3.5 days per diem @ $100/day - 6 trips)	$3.0	$1.0
	Anchorage to Juneau travel to brief Trustee Council members, Executive Director, and/or negotiators. ($450 airfare + 4 days per diem @ $160/day - 2 trips	$1.0	$1.0
	Travel Total	$4.0	$2.0
Contractual:			
Rept Intrm	Air charters for parcel surveys. (12 hours @ $250/hour)	$2.0	$1.0
	Contractual Total	$2.0	$1.0

Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

Commodities:		Reprt/Intrm	Remaining
Rept			
Intrm	Computer software and upgrades, toner cartridges, data cartridges and supplies.	$1.0	$1.0
	Office supplies and field equipment (waterproof paper, pens batteries, film and processing)	$1.5	$0.5
	Commodities Total	$2.5	$1.5
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95126
Project Title: Habitat Protection & Acquisition Support
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Nanwalek, Port Graham, Tatitlek Clam Restoration- This project will develop the technology and begin to reestablish local clam populations for subsistence use in the Nanwalek/Port Graham and Tatitlek areas. Clams were once a major subsistence food in these communities, but the local clam populations have been decreasing in recent years and their contribution to the subsistence harvest has been greatly reduced. The Qutekcak Shellfish Hatchery in Seward will be used to supply clam seedstock for reseeding suitable areas with easy access from the villages.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$7.2	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$77.1	$338.8	$415.9	$497.9	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$77.1	$346.0	$423.1	$505.1	
General Administration	$0.0	$5.4	$16.5	$21.9	$23.5	
Project Total	$0.0	$82.5	$362.5	$445.0	$528.6	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Program Manager	0.0	$0.0	1.3	$7.2
Intrm				
Rem				
Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95131
Project Title: Nanwalek, Port Graham, Tatitlek Clam Restoration
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Intrm	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with Chugach Regional Resources Commission to complete this project	$77.1	$338.8
Contractual Total	$77.1	$338.8

Project Number: 95131
Project Title: Nanwalek, Port Graham, Tatitlek Clam Restoration
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

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

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1995

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Project Number: 95131
Project Title: Nanwalek, Port Graham, Tatitlek Clam Restoration
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Nanwalek, Port Graham, Tatitlek Clam Restoration- This project will develop the technology and begin to reestablish local clam populations for subsistence use in the Nanwalek/Port Graham and Tatitlek areas. Clams were once a major subsistence food in these communities, but the local clam populations have been decreasing in recent years and their contribution to the subsistence harvest has been greatly reduced. The Qutekcak Shellfish Hatchery in Seward will be used to supply clam seedstock for reseeding suitable areas with easy access from the villages.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$14.2	$103.5	$117.7	$121.5	$0.0	$14.2	$0.0	$121.5
Travel	$0.0	$2.9	$3.5	$6.4	$7.2	$0.0	$2.9	$0.0	$7.2
Contractual	$0.0	$49.0	$143.9	$192.9	$203.6	$0.0	$49.0	$0.0	$203.6
Commodities	$0.0	$0.0	$40.9	$40.9	$77.2	$0.0	$0.0	$0.0	$77.2
Equipment	$0.0	$0.0	$14.0	$14.0	$40.0	$0.0	$0.0	$0.0	$40.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$66.1	$305.8	$371.9	$449.5	$0.0	$66.1	$0.0	$449.5
General Administration	$0.0	$11.0	$33.0	$44.0	$48.4	$0.0	$11.0	$0.0	$48.4
Project Total	$0.0	$77.1	$338.8	$415.9	$497.9	$0.0	$77.1	$0.0	$497.9
Full-time Equivalents (FTE)		0.3	3.5	3.8	4.9				

Dollar amounts are shown in thousands of dollars.

Report writing for this project will be a condition of the contract, no additional funds will be requested.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
3 Village Project Leaders	4.0	$14.2	15.0	$47.3
15 Village Project Workers	0.0	$0.0	27.0	$56.2
Personnel Total	4.0	$14.2	42.0	$103.5

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95131
Project Title: Nanwalek, Port Graham, Tatitlek Clam Restoration
Agency: Chugach Regional Resources Commission

FORM 4A SUB-PROJECT CONTRACTUAL DETAIL

		Reprt/Intrm	Remaining
Travel:			
Intrm	3 RT Villages/Juneau @ $650 + 9 days per diem @ $100	$2.9	$0.0
	3 RT Villages/Seattle @ $700 + 12 days per diem @ $100 + 4 days car rental @ $50/day		$3.5
	Travel Total	$2.9	$3.5
Contractual:			
Intrm			
Intrm	Contract with Qutekcak Shellfish Hatchery to develop technology and to produce approximately 4 million seed clams	$34.0	$102.0
Intrm	Contract for consultant to obtain permits	$7.5	$5.0
	Contract for consultant (clam expert) to provide technical support for this project	$7.5	$22.5
	Beach preparation equipment- approximately 40 days use of a backhoe @ $300/day + delivery to sites ($2.4)	$0.0	$14.4
	Contractual Total	$49.0	$143.9

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Project Number: 95131
Project Title: Nanwalek, Port Graham, Tatitlek Clam Restoration
Agency: Chugach Regional Resources Commission

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Commodities:		Reprt/Intrm	Remaining
Intrm	Safety supplies for crews- 12 ea. of floatcoats($3.6) , raingear, boots, gloves($3.6), first aid kits($.6), radios ($.6)	$0.0	$9.9
	Hand tools and power equipment for beach site preparation (gas powered tillers, shovels, hoes, wire mesh, burlap)	$0.0	$15.0
	Systems components for seeding (rack and bag seeding systems 6 sites @ $2.0	$0.0	$12.0
	Misc. marine hardware and boat safety supplies (anchors, oars, line, connectors, hardware, extinguishers)	$0.0	$4.0
	Commodities Total	$0.0	$40.9
Equipment:			
Rept Intrm	3 18' aluminum skiffs with 40 hp outboard motors @ approximately $4.6	$0.0	$14.0
	Equipment Total	$0.0	$14.0

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Project Number: 95131
Project Title: Nanwalek, Port Graham, Tatitlek Clam Restoration
Agency: Chugach Regional Resources Commission

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Project Description: Port Graham and Nanwalek Subsistence Baseline- This project proposes a subsistence foods testing program to establish baseline data on all subsistence salmon fishing and shellfish gathering areas used by the people of Port Graham and Nanwalek.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$488.2	$488.2	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$495.4	$495.4	$0.0	
General Administration	$0.0	$0.0	$23.3	$23.3	$0.0	
Project Total	$0.0	$0.0	$518.7	$518.7	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Program Manager	0.0	$0.0	1.3	$7.2
Intrm				
Rem				
Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95132
Project Title: Port Graham and Nanwalek Subsistence Baseline
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Intrm	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with Port Graham Village Council to complete this project	$0.0	$488.2
Contractual Total	$0.0	$488.2

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Project Number: 95132
Project Title: Port Graham and Nanwalek Subsistence Baseline
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

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

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Project Number: 95132
Project Title: Port Graham and Nanwalek Subsistence Baseline
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Project Description: Port Graham and Nanwalek Subsistence Baseline- This project proposes a subsistence foods testing program to establish baseline data on all subsistence salmon fishing and shellfish gathering areas used by the people of Port Graham and Nanwalek.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$13.2	$13.2	$0.0	$0.0	$0.0	$0.0	$0.0
Travel	$0.0	$0.0	$25.3	$25.3	$0.0	$0.0	$0.0	$0.0	$0.0
Contractual	$0.0	$0.0	$415.6	$415.6	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$0.0	$0.0	$0.5	$0.5	$0.0	$0.0	$0.0	$0.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$454.6	$454.6	$0.0	$0.0	$0.0	$0.0	$0.0
General Administration	$0.0	$0.0	$33.6	$33.6	$0.0	$0.0	$0.0	$0.0	$0.0
Project Total	$0.0	$0.0	$488.2	$488.2	$0.0	$0.0	$0.0	$0.0	$0.0
Full-time Equivalents (FTE)	0.7	0.0	0.3	0.3	4.9				

Dollar amounts are shown in thousands of dollars.

Report writing for this project will be a condition of the contract, no additional funds will be requested.

96 field costs were not reported for this budget deadline.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project leader	0.0	$0.0	0.8	$3.1
2 Local assistants	0.0	$0.0	2.0	$6.7
2 Skiff Drivers	0.0	$0.0	1.0	$3.4
Personnel Total	0.0	$0.0	3.8	$13.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95132
Project Title: Port Graham and Nanwalek Subsistence Baseline
Agency: Port Graham Village Council

FORM 4A SUB-PROJECT CONTRACTUAL DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	4 RT Anchorage/Port Graham/Nanwalek @ $200	$0.0	$0.8
	4 Helicopter trips Port Graham/Nanwalek/sampling sites @ $5,000	$0.0	$20.0
	Skiff rental Port Graham/Nanwalek/sampling sites 15 days X $300/day	$0.0	$4.5
	Travel Total	$0.0	$25.3
Contractual:			
Intrm			
Intrm	Hydrocarbon testing	$0.0	$315.6
Intrm	Biological Consultants	$0.0	$100.0
	Contractual Total	$0.0	$415.6

Project Number: 95132
Project Title: Port Graham and Nanwalek Subsistence Baseline
Agency: Port Graham Village Council

FORM 4B
SUB-PROJECT
CONTRACTUAL
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Intrm Supplies, paper, collection forms, etc.	$0.0	$0.5
Commodities Total	$0.0	$0.5
Equipment:		
Rept	$0.0	$0.0
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95132
Project Title: Port Graham and Nanwalek Subsistence Baseline
Agency: Port Graham Village Council

FORM 4B
SUB-PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Project Description: English Bay River Sockeye Salmon Subsistence Project- This project will assist in the effort to build the English Bay sockeye run back to historic levels. The sockeye return to the English Bay River system, located near the villages of Nanwalek and Port Graham, was once a primary source for subsistence and cash for these villages. Over the past 12 years the run size has been steadily dropping from about 35,000 adults to the current average of about 5,000 adults. This has resulted in a complete closure of both the subsistence and commercial fishery. The project will focus on producing sufficient numbers of high quality smolts through lake pen rearing to create adult returns of historic levels.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$7.2	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$129.8	$129.8	$126.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$137.0	$137.0	$133.2	
General Administration	$0.0	$0.0	$10.2	$10.2	$9.9	
Project Total	$0.0	$0.0	$147.2	$147.2	$143.1	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1	0.1	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Program Manager	0.0	$0.0	1.3	$7.2
Intrm				
Rem				
Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95133
Project Title: English Bay River Sockeye Salmon Subsistence Project
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Intrm	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with English Bay Village Council to complete this project	$0.0	$125.3
Tag analysis and acoustic surveys	$0.0	$4.5
Contractual Total	$0.0	$129.8

Project Number: 95133
Project Title: English Bay River Sockeye Salmon Subsistence Project
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

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

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

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Project Number: 95133
Project Title: English Bay River Sockeye Salmon Subsistence Project
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Project Description: English Bay River Sockeye Salmon Subsistence Project- This project will assist in the effort to build the English Bay sockeye run back to historic levels. The sockeye return to the English Bay River system, located near the villages of Nanwalek and Port Graham, was once a primary source for subsistence and cash for these villages. Over the past 12 years the run size has been steadily dropping from about 35,000 adults to the current average of about 5,000 adults. This has resulted in a complete closure of both the subsistence and commercial fishery. The project will focus on producing sufficient numbers of high quality smolts through lake pen rearing to create adult returns of historic levels.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$37.3	$37.3	$39.2	$0.0	$0.0	$0.0	$39.2
Travel	$0.0	$0.0	$4.5	$4.5	$4.7	$0.0	$0.0	$0.0	$4.7
Contractual	$0.0	$0.0	$32.5	$32.5	$25.0	$0.0	$0.0	$0.0	$25.0
Commodities	$0.0	$0.0	$17.0	$17.0	$18.0	$0.0	$0.0	$0.0	$18.0
Equipment	$0.0	$0.0	$7.5	$7.5	$11.3	$0.0	$0.0	$0.0	$11.3
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$98.8	$98.8	$98.2	$0.0	$0.0	$0.0	$98.2
General Administration	$0.0	$0.0	$26.5	$26.5	$27.8	$0.0	$0.0	$0.0	$27.8
Project Total	$0.0	$0.0	$125.3	$125.3	$126.0	$0.0	$0.0	$0.0	$126.0
Full-time Equivalents (FTE)	0.7	0.0	1.5	1.5	1.6				

Dollar amounts are shown in thousands of dollars.

Report writing for this project will be a condition of the contract, no additional funds will be requested.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
6 Village Project workers	0.0	$0.0	18.0	$37.3
Personnel Total	0.0	$0.0	18.0	$37.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95133
Project Title: English Bay River Sockeye Salmon Subsistence Project
Agency: Nanwalek Village Council

FORM 4A SUB-PROJECT CONTRACTUAL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	2 RT English Bay/Southeast to sockeye salmon workshop @ $650 + 8 days per diem @ $150	$0.0	$2.5
	2 RT English Bay/Anchorage to attend fish pathology workshop @ $400 + 8 days per diem@ $150	$0.0	$2.0
	Travel Total	$0.0	$4.5
Contractual:			
Intrm			
Intrm	Consultant with expertise in fish culture and project operations (May-November)	$0.0	$22.0
Intrm	Land and building rental in Nanwalek (3 buildings for a total of 18 months)	$0.0	$10.5
	Contractual Total	$0.0	$32.5

Project Number: 95133
Project Title: English Bay River Sockeye Salmon Subsistence Project
Agency: Nanwalek Village Council

FORM 4B
SUB-PROJECT
CONTRACTUAL
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Fish food @ $0.70/pound	$0.0	$9.0
	Fish culture equipment	$0.0	$3.3
	Safety equipment	$0.0	$2.0
	Egg take supplies	$0.0	$1.2
	Weir supplies	$0.0	$1.5
	Commodities Total	$0.0	$17.0
Equipment:			
Rept	Smolt sorting system	$0.0	$7.5
Intrm			
	Equipment Total	$0.0	$7.5

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Project Number: 95133
Project Title: English Bay River Sockeye Salmon Subsistence Project
Agency: Nanwalek Village Council

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project recovers coded wire tags from adult sockeye and chum salmon tagged as fry emerging from hatcheries in PWS. Tag recovery data from this project are used to estimate catch contributions, total returns, and marine survival rates for wild and hatchery fish. Inseason catch contribution estimates for hatchery and wild fish make it possible for fisheries managers to modify temporal and spatial fishing patterns to reduce harvest rates on salmon populations that may have been injured by the EVOS.

Budget Category:	1994 Project No. 94137 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 96 Field	Comment 95 Report
Personnel	$208.9	$39.5	$169.3	$208.8	$209.5	$170.0	$39.5
Travel	$1.8	$6.0	$2.6	$8.6	$8.5	$7.7	$0.8
Contractual	$17.2	$3.2	$17.2	$20.4	$20.4	$17.2	$3.2
Commodities	$1.2	$1.0	$6.0	$7.0	$7.0	$5.0	$2.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$229.1	$49.7	$195.1	$244.8	$245.4	$199.9	$45.5
General Administration	$32.5	$6.1	$26.6	$32.7	$32.8	$26.7	$6.1
Project Total	$261.6	$55.8	$221.7	$277.5	$278.2	$226.6	$51.6
Full-time Equivalents (FTE)	4.4	0.7	3.7	4.4			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept 1 Fishery Biologist III	0.0	$0.0	1.0	$6.6
2 Fishery Biologist I & II	3.0	$15.3	4.5	$22.5
1 Biometrician I	1.0	$5.0	0.0	$0.0
1 Fish and Wildlife Technicians III	1.0	$3.4	3.5	$12.9
11 Fish and Wildlife Technicians II	2.0	$6.2	32.9	$117.8
1 Field Office Assistant	0.0	$0.0	1.0	$3.5
1 Data Analyst	1.0	$5.4	0.0	$0.0
1 Program Manager	0.8	$4.2	1.0	$6.0
Personnel Total	8.8	$39.5	43.9	$169.3

NEPA Cost: $0.0

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**Jan 1, 1995 - Sep 30, 1995

Project Number: 95137

Project Title: Prince William Sound Salmon Stock Identification and Monitoring Studies

Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	4 RT Cordova/Anchorage @ $0.2 + 28 days per diem (Winter workshops)	$5.0	$0.0
	2 RT Anchorage/Cordova @ $$0.2 + 4 days per diem (Biometrician support)	$1.0	$0.0
Rem	3 RT Anchorage/Cordova @ $0.2 + 6 days per diem (Biometrician support)	$0.0	$1.4
	1 RT Cordova/Anchorage/Whittier/Kodiak @ $0.6 + 4 days per diem (Supervisory)	$0.0	$1.2
	Travel Total	$6.0	$2.6
Contractual:			
Rept	Air charter to hatcheries for brood sampling and sample pickup 6 hours @ $0.35	$2.0	$0.0
		$1.2	$0.0
Rem	Air charter to hatcheries and sample pickup 28 hours @ $0.25	$0.0	$7.0
	Seasonal office rental (Valdez and Whittier) @ $0.5 for 4 months	$0.0	$2.0
	DOT vehicle rental 8 months @ $0.4	$0.0	$3.2
	Air freight for Tag lab salmon head shipments	$0.0	$4.0
	Computer repair and maintenance at Tag lab	$0.0	$1.0
	Contractual Total	$3.2	$17.2

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Rain gear, boots and gloves for 3 people @ $0.2	$0.6	$0.0
	Knives, forceps, containers, tag sampling kits	$0.4	$0.2
	Rain gear, boots, gloves for 9 people @ $0.2	$0.0	$1.8
	Tag removal and reading supplies for the Tag Lab	$0.0	$4.0
	Commodities Total	$1.0	$6.0
Equipment:			
Rept		$0.0	$0.0
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95137
Project Title: Prince William Sound Salmon Stock Identification and Monitoring Studies
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Elders/Youth Conference- The goal of this project is to promote recovery of subsistence uses of natural resources of the oil spill areas through a conference that would involve elders, youth and other representatives of spill area communities and the subsistence skills which have been affected and need to be strengthened. The role of traditional knowledge in informing people about the spill's effects will be explored.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$16.3	$16.3	$0.0	
Travel	$0.0	$0.0	$44.4	$44.4	$0.0	Reporting for this project will be in the form
Contractual	$0.0	$0.0	$21.0	$21.0	$0.0	of a meetings proceedings and video of the
Commodities	$0.0	$0.0	$0.2	$0.2	$0.0	conference. No additional report writing
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	funds will be requested.
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$81.9	$81.9	$0.0	
General Administration	$0.0	$0.0	$3.9	$3.9	$0.0	
Project Total	$0.0	$0.0	$85.8	$85.8	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.2	0.2		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm	Program Manager	0.0	$0.0	0.8	$4.2
Intrm	Subsistence Resource Specialist II	0.0	$0.0	1.0	$4.7
Rem	Visual Information Specialist	0.0	$0.0	0.5	$3.1
	Subsistence Regional Program Manager	0.0	$0.0	0.5	$4.3
	Personnel Total	0.0	$0.0	2.8	$16.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95138
Project Title: Elders/Youth Conference
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Travel:	Reprt/Intrm	Remaining
1 RT Chenega/Anchorage @ $1.0	$0.0	$1.0
1 RT Tatitlek/Anchorage @ $1.0	$0.0	$1.0
3 charters to bring Kodiak village representatives to Kodiak and return @ approximately $0.65	$0.0	$2.0
28 RT Kodiak City/Anchorage @ approximately $0.2	$0.0	$5.5
8 RT Port Graham/Nanwalek/Homer @ $0.11	$0.0	$0.9
8 RT Homer/Anchorage @ $0.11	$0.0	$0.9
4 RT Seward/Anchorage @ $0.125	$0.0	$0.5
4 RT Cordova/Anchorage @ $0.2	$0.0	$0.8
4 RT Valdez/Anchorage @ $0.15	$0.0	$0.6
20 RT Chignik Bay/Lake/Lagoon/Perryville/Ivanof Bay/Anchorage @ $0.8	$0.0	$16.0
1 RT Juneau/Anchorage @ 0.45	$0.0	$0.5
77 persons X 2 days per diem @ $95/day	$0.0	$14.7
Travel Total	$0.0	$44.4
Contractual:		
Design content of conference and prepare proceedings	$0.0	$15.0
Printing and collation of proceedings	$0.0	$1.4
Production of a videotape of conference	$0.0	$4.6
Contractual Total	$0.0	$21.0

Project Number: 95138
Project Title: Elders/Youth Conference
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Office supplies (paper, pens, toner, etc.)	$0.0	$0.2
Commodities Total	$0.0	$0.2
Equipment:		
Rept		
Intrm None	$0.0	$0.0
Equipment Total	$0.0	$0.0

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Project Number: 95138
Project Title: Elders/Youth Conference
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Salmon Instream Habitat & Stock Restoration - The project at Little Waterfall Creek on Afognak Island will benefit pink and coho salmon by providing access to under utilized habitat with a capacity for 24,000 spawners. Little Waterfall Bay was also oiled by the EVOS. Recreational and commercial fishing groups will benefit from the project.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$10.7	$10.7	$10.7	
Travel	$0.0	$0.0	$0.3	$0.3	$0.3	
Contractual	$0.0	$0.0	$71.8	$71.8	$1.8	
Commodities	$0.0	$0.0	$0.6	$0.6	$0.6	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$83.4	$83.4	$13.4	
General Administration	$0.0	$0.0	$6.6	$6.6	$1.7	
Project Total	$0.0	$0.0	$90.0	$90.0	$15.1	
Full-time Equivalents (FTE)		0.0	0.2	0.2		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	0.5	$3.4
Fishery Biologist II (KDK)	0.0	$0.0	1.0	$5.0
Fishery Technician III (KDK)	0.0	$0.0	0.4	$1.4
Fishery Technician II (KDK)	0.0	$0.0	0.3	$0.9
Personnel Total	0.0	$0.0	2.2	$10.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95139A1
Project Title: Salmon Instream Habitat & Stock Restoration
Agency: Ak. Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Round trip travel Anchorage to Kodiak (1 trip @ $300/trip)	$0.0	$0.3
Travel Total	$0.0	$0.3
Contractual:		
Contract to design and build a barrier bypass to allow salmon access to spawning grounds upstream of Little Waterfall Creek barrier.	$0.0	$70.0
Air charter to project site	$0.0	$1.8
Contractual Total	$0.0	$71.8

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Project Number: 95139A1
Project Title: Salmon Instream Habitat & Stock Restoration
Agency: Ak. Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Office supplies	$0.0	$0.3
Field sampling and camping supplies	$0.0	$0.3
Commodities Total	$0.0	$0.6
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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1995

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Project Number: 95139A1
Project Title: Salmon Instream Habitat & Stock Restoration
Agency: Ak. Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: An intermittent tributary of Port Dick Creek was selected for instream habitat and restoration by constructing a pink and chum salmon spawning channel. The channel is intended to accelerate the recovery of salmon stocks injured by the *Exxon Valdez* oil spill and to increase the numbers of salmon available to sport, commercial and subsistence users.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel		$16.7	$28.5	$45.2	$0.0
Travel		$0.5	$1.0	$1.5	$0.0
Contractual		$3.3	$92.7	$96.0	$0.0
Commodities		$4.0	$7.4	$11.4	$0.0
Equipment		$2.0	$2.0	$4.0	$0.0
Capital Outlay		$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$26.5	$131.6	$158.1	$0.0
General Administration		$2.7	$10.8	$13.5	$0.0
Project Total	$0.0	$29.2	$142.4	$171.6	$0.0
Full-time Equivalents (FTE)		0.4	0.6	1.0	
Dollar amounts are shown in thousands of dollars.					

Comment

Estimates for funding in FFY96 is approximately $32.1K. The breakout for that budget figure is not available at this time.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Rem FWT IV	2.0	$8.0	3.0	$10.8
FWT III	2.0	$7.2	3.4	$13.6
Program Manager	0.3	$1.5	0.8	$4.1
Personnel Total	4.3	$16.7	7.2	$28.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95139-A2
Project Title: Spawning Channel-Port Dick Creek
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm	2 RT Anchorage/Homer to consult with engineer @ $250/trip	$0.5	$0.0
Rem	4 RT Homer-Anchorage @ $250/RT	$0.0	$1.0
	Travel Total	$0.5	$1.0
Contractual:			
Rept			
Intrm			
Rem	3 RT by helicopter to spawning channel location for water level data retreival@ $750/RT	$2.3	$0.0
	Water level recorder data analysis by consulting engineer	$1.0	$0.0
	10 helicopter trips to spawnkng channels for data retrieval and construction supervision and monitoring @ $750/trip	$0.0	$7.5
	3 days charters for 112'landing craft barge to transport construction equipment to and from channel site @ $3.7/day	$0.0	$11.1
	Contractual costs for construction of spawning channel	$0.0	$74.1
	Contractual Total	$3.3	$92.7

Project Number: 95139-A2
Project Title: Spawning Channel-Port Dick Creek
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Commodities:		Reprt/Intrm	Remaining
Rept			
Intrm			
Rem	2 net pens to hold adult salmon prior to egg-take @ $0.5/pen	$1.0	$1.0
	Materials for instream egg incubator boxes (aluminum sheeting, perforated plate).	$2.0	$3.0
	Misc. fish culture supplies (ice chests, water containers, raingear, etc.)	$1.0	$2.0
	Food for 30 days for 3 people at $15/day/person.	$0.0	$1.4
	Commodities Total	$4.0	$7.4
Equipment:			
Rept			
Intrm			
Rem	1 ea instream water level recorder to measure water table fluctuations at spawning channel site.	$2.0	$0.0
	1 computer monitor and printer to log and analyze water table data, to produce and store reports and graphs	$0.0	$2.0
	Equipment Total	$2.0	$2.0

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Project Number: 95139-A2
Project Title: Spawning Channel-Port Dick Creek
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: FY 95 funds are for completion of a report covering FY 94 field work at Otter Creek and Shrode Creek.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$4.5	$0.0	$4.5		
Travel		$0.0	$0.0	$0.0		
Contractual		$0.0	$0.0	$0.0		
Commodities		$0.0	$0.0	$0.0		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$4.5	$0.0	$4.5	$0.0	
General Administration		$0.7	$0.0	$0.7	$0.0	
Project Total	$0.0	$5.2	$0.0	$5.2	$0.0	
Full-time Equivalents (FTE)		0.1	0.0	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm	Fisheries Biologist GS - 09	0.6	$2.6		
	Fisheries Tech GS - 07	0.6	$1.9		
	Personnel Total	1.2	$4.5	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95139B

Project Title: Salmon Instream Habitat & Stock Restoration - Shrode and Otter Creek

Agency: Dept. of Agriculture, Forest Service

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

07/14/93

1995

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Project Number: 95139B
Project Title: Salmon Instream Habitat & Stock Restoration - Shrode and Otter Creek
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

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

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

07/14/93

1995

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Project Number: 95139B
Project Title: Salmon Instream Habitat & Stock Restoration - Shrode and Otter Creek
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

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

Project Description: In FY 1994 the Cordova Ranger District received funding to construct 25-30 structures in streams flowing through clearcut areas on Montague Island. The reasons for building these structures are to improve fish spawning and rearing habitat, prevent erosion, and help restore the natural flows and stream features that existed before the logging. The 1994 work also included the improvement of 20 acres of riparian vegetation. In FY 1995, the District proposes to monitor and evaluate these structures to ensure that they are functioning as intended, repair any damage that may have occurred, and assess the changes in the aquatic habitat, stream channels, and substrates. The riparian vegetation work will also be monitored and assessed.

Budget Category:	1994 Project No. 94139c Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$56.2	$0.0	$31.7	$31.7	$29.2	This project is a follow up to 94139.
Travel	$8.4	$0.0	$0.0	$0.0	$4.2	
Contractual	$0.0	$0.0	$4.2	$4.2	$0.0	
Commodities	$6.5	$0.0	$1.8	$1.8	$1.8	
Equipment	$7.7	$0.0	$3.5	$3.5	$3.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$78.8	$0.0	$41.2	$41.2	$38.7	
General Administration	$8.4	$0.0	$5.0	$5.0	$4.4	
Project Total	$87.2	$0.0	$46.2	$46.2	$43.1	
Full-time Equivalents (FTE)		0.0	0.9	0.9		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Program Mgr.			0.5	$2.5
Fish Bio GS-11			1.0	$4.3
Silviculturist GS-11			1.0	$4.2
Fish Bio GS-9			1.8	$7.7
GIS Tech GS-7			1.0	$2.8
GS-5			1.8	$4.2
GS-3			4.0	$6.0
Personnel Total	0.0	$0.0	11.1	$31.7

NEPA Cost:	$0.0
*Oct 1, 1994 - Dec 31, 1994	
**Jan 1, 1995 - Sep 30, 1995	

06/01/94

1995

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Project Number: 95139-C1
Project Title: Montague Riparian Rehabilitation Monitoring Program
Agency: USDA Forest Service

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm			
	Travel Total	$0.0	$0.0
Contractual:			
Rept			
Intrm	3 RT flights DH Beaver 12 hrs @ 350 / hr		$4.2
	Contractual Total	$0.0	$4.2

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Project Number: 95139-C1
Project Title: Montague Riparian Rehabilitation Monitoring Program
Agency: USDA Forest Service

FORM 2A
PROJECT
DETAIL

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm Field per diem 120 days at 15 / day		$1.8
Commodities Total	$0.0	$1.8
Equipment:		
Rept		
Intrm		$3.5
Equipment Total	$0.0	$3.5

Project Number: 95139-C1
Project Title: Montague Riparian Rehabilitation Monitoring Program
Agency: USDA Forest Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Salmon Instream Habitat & Stock Restoration - The project at 6.5 mile Richardson Highway near Valdez will benefit pink, coho, and chum salmon. The spawning habitat created by the project will likely suppor 7,186 pink, 5,134 chum, and 822 coho salmon spawners. These species are utilized for sport fishing, viewing, and commercial fishing in the Valdez area. Recreational fishing, tourism, and the commercial fishing industry will benefit from this project.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$24.6	$24.6		
Travel		$0.0	$2.1	$2.1		
Contractual		$0.0	$129.8	$129.8		
Commodities		$0.0	$0.8	$0.8		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$157.3	$157.3	$0.0	
General Administration		$0.0	$12.8	$12.8	$0.0	
Project Total	$0.0	$0.0	$170.1	$170.1	$0.0	
Full-time Equivalents (FTE)		0.0	0.6	0.6		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Fishery Biologist	0.0	$0.0	1.0	$6.7
Program Manager	0.0	$0.0	3.8	$12.1
Fishery Biologist I (CDV)	0.0	$0.0	1.5	$4.6
Fishery Technician II (CDV)	0.0	$0.0	0.3	$1.2
Draftsman (ANC)	0.0	$0.0		
Personnel Total	0.0	$0.0	6.6	$24.6

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95139C2
Project Title: Salmon Instream Habitat & Stock Restoration - Lowe River (6.5 mi Richardson Hwy)
Agency: Ak. Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Per diem for tavel to project site in Valdez (14 days @ $150/day)	$0.0	$2.1
Travel Total	$0.0	$2.1
Contractual:		
Channel construction contract	$0.0	$105.3
Richardson Highway culvert installation (optional)	$0.0	$20.0
Air charter from Cordova to Valdez (6 round trips @ $750/trip)	$0.0	$4.5
Contractual Total	$0.0	$129.8

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1995

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Project Number: 95139C2
Project Title: Salmon Instream Habitat & Stock Restoration - Lowe River (6.5 mi Richardson Hwy)
Agency: Ak. Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Office supplies (pencils, paper, folders, xerox toner cartridges, printer cartridges, etc.)	$0.0	$0.8
Commodities Total	$0.0	$0.8
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

07/14/93

1995

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Project Number: 95139C2
Project Title: Salmon Instream Habitat & Stock Restoration - Lowe River (6.5 mi Richardson Hwy)
Agency: Ak. Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Salmon instream habitat, stock restoration and Pink Creek and Horse Marine barrier bypass development projects are designed to replace injured salmon spawning habitat by providing access to existing habitat.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$5.2	$37.5	$42.7		
Travel		$0.6	$0.6	$1.2		
Contractual		$1.0	$3.2	$4.2		
Commodities		$0.2	$6.6	$6.8		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$7.0	$47.9	$54.9	$0.0	
General Administration		$0.9	$5.8	$6.7	$0.0	
Project Total	$0.0	$7.9	$53.7	$61.6	$0.0	
Full-time Equivalents (FTE)		0.1	0.7	0.8		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
	Engineer	0.0	$0.0	0.5	$2.7
Intrm	Fishery Biologist II	1.0	$5.2	1.0	$5.2
	Fishery Biologist I	0.0	$0.0	2.0	$8.6
	Fish and Wildlife Technician III	0.0	$0.0	2.0	$8.3
	Fish and Wildlife Technician II	0.0	$0.0	2.0	$6.7
	Program Manager	0.0	$0.0	1.0	$6.0
	Personnel Total	1.0	$5.2	8.5	$37.5

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95139D
Project Title: Salmon Instream Restoration: Pink Creek and Horse Marine Bypass
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	2 roundtrip Kodiak to Anchorage for meetings @ $.03	$0.6	
	2 roundtrip Anchorage to Kodiak by engineer to inspect project		$0.6
	Travel Total	$0.6	$0.6
Contractual:			
Intrm	Postage, copier	$0.2	
	Long distance phone charges	$0.3	
	Freight	$0.5	$0.5
	Air charters 6 hours @ $.03		$1.8
	Equipment repairs and maintenance agreements		$0.9
	Contractual Total	$1.0	$3.2

07/14/93

1995

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Project Number: 95139D
Project Title: Salmon Instream Restoration: Pink Creek and Horse Marine Bypass
Agency: AK Dept. of F[illegible] & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995
Agency: AK Dept. of Fish & Game

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Miscellaneous office supplies	$0.2	$0.2
	Groceries for 3 people for 60 days @ $20/person/day		$3.6
	Rain gear and boots 4 people @ $.2		$0.8
	Boat and camp fuel (300 gallons @ $1.50/gallon)		$0.5
	Lumber and hardware		$1.5
	Commodities Total	$0.2	$6.6
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

07/14/93

1995

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Project Number: 95139D
Project Title: Salmon Instream Restoration: Pink Creek and Horse Marine Bypass
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project provides for interim support for operations to enable field staff and volunteers to monitor use of the new park, discourage resource degradation, and oversee actions taken to comply with road closure plan and reforestation requirements. Additionally this project will provide for the movement of overburden back onto road surface in order to hasten revegetaion of existing logging roads. This is in addition to requirements that the sellers stabilize the road surfaces.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$10.0	$10.0	$0.0	
Travel	$0.0	$0.0	$4.0	$4.0	$0.0	
Contractual	$0.0	$0.0	$274.0	$274.0	$0.0	
Commodities	$0.0	$0.0	$2.0	$2.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$290.0	$290.0	$0.0	
General Administration	$0.0	$0.0	$19.5	$19.5	$0.0	
Project Total	$0.0	$0.0	$309.5	$309.5	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.2	0.2	0.0	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95141
Project Title: Afognak Island State Park Interim Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project provides for interim support for operations to enable field staff and volunteers to monitor use of the new park, discourage resource degradation, and oversee actions taken to comply with road closure plan and reforestation requirements. Additionally this project will provide for the movement of overburden back onto road surface in order to hasten revegetaion of existing logging roads. This is in addition to requirements that the sellers stabilize the road surfaces.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$10.0	$10.0		
Travel		$0.0	$4.0	$4.0		
Contractual		$0.0	$274.0	$274.0		
Commodities		$0.0	$2.0	$2.0		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$290.0	$290.0	$0.0	
General Administration		$0.0	$19.5	$19.5	$0.0	
Project Total	$0.0	$0.0	$309.5	$309.5	$0.0	
Full-time Equivalents (FTE)		0.0	0.2	0.2		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Park Ranger I			1.0	$4.0
Park Ranger II			1.2	$6.0
Personnel Total	0.0	$0.0	2.2	$10.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95141
Project Title: Afognak Island State Park Interim Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel from Anchorage to Kodiak to Afognak Island. (Four trips @ $1,000 per trip, includes per diem and/or cost of field lodging for 5 days per trip)		$4.0
Travel Total	$0.0	$4.0
Contractual:		
Rept		
Intrm		
Contractual obligations necessary to move overburden back onto road beds and stabilize soil for revegetation. (Includes 480 hours of heavy equipment usage @ $350/hour, labor and lodging for crew for an estimate 8 week period, mobilization and demobilization costs)		$270.0
Air charters, float planes for travel from Kodiak to Afognak (16 hours @ $250/hour -- approximately four trips)		$4.0
Contractual Total	$0.0	$274.0

Project Number: 95141
Project Title: Afognak Island State Park Interim Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm		
Field and office supplies, write in rain paper, film, processing, field gear.		$2.0
Commodities Total	$0.0	$2.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95141
Project Title: Afognak Island State Park Interim Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description:

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

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95141
Project Title: Afognak Island State Park Interim Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95141
Project Title: Afognak Island State Park Interim Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
PROJECT
DETAIL

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

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

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Project Number: 95141
Project Title: Afognak Island State Park Interim Support
Sub-Project:
Agency: AK Dept. of Natural Resources

FORM 3B
SUB-
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DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project would repeat the boat surveys of marine bird and sea otter populations in PWS conducted in 1989, '09, '91, '93, and '94. The purpose of this year's study is to obtain population estimates of marine birds and sea otters in PWS to monitor the recovery of species whose populations may have declined due to the oil spill and to determine whether additional species may still be declining as a result of the oil spill. FFY 95 costs include data analysis and report writing.

Budget Category:	1994 Project No. 94159 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$104.8	$0.0	$202.2	$202.2	$10.0	FY97 $440.6K ($426.8K + 6% increase for personnel)
Travel	$7.5	$0.0	$14.0	$14.0	$0.0	
Contractual	$23.0	$0.0	$111.0	$111.0	$50.0	FY98 $65K
Commodities	$8.5	$0.0	$34.5	$34.5	$0.0	
Equipment	$27.0	$0.0	$27.0	$27.0	$0.0	
Capital Outlay		$0.0	$0.0	$0.0	$0.0	
Subtotal	$170.8	$0.0	$388.7	$388.7	$60.0	
General Administration	$17.8	$0.0	$38.1	$38.1	$5.0	
Project Total	$188.6	$0.0	$426.8	$426.8	$65.0	
Full-time Equivalents (FTE)	1.4	0.0	5.2	5.2	0.3	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Project Leader, GS-11			15.0	$66.5
Biologist, GS-9			15.0	$56.7
Bio. Tech., GS-5 (4)			26.0	$52.0
Expediter			3.0	$10.0
Project Manager			2.0	$11.0
Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	62.0	$202.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95159
Project Title: Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in PWS
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A PROJECT DETAIL

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

Travel:	Reprt/Intrm	Remaining
Rept		
Intrm		
Anchorage to Whittier: Boat transport from storage to field - 9 trips @$1200./trip		$10.8
Anchorage to Whittier: to mobilize and demobilize the field camps; 6 people - 3 trips @$100./trip		$1.8
Field per diem: 6 people - 55 days @$3./day		$1.0
Anchorage to Cordova/Valdez: travel for additional field personnel (e.g., substitutes, resupply, supervision) 1 trip @$360./trip		$0.4
Travel Total	$0.0	$14.0
Contractual:		
Rept		
Intrm		
Contract w/ local Tatitlik and Chenega people to survey birds		$50.0
Charter vessel: 2 surveys @$25.5K/survey		$51.0
Safety training - 6 people @$830./person (e.g., Watercraft safety, Marine survival, First aid, CPR)		$5.0
Warehouse rental (equipment and boat storage)		$2.5
Truck rental (to transport boat from storage to field, transport personnel)		$2.5
Contractual Total	$0.0	$111.0

Project Number: 95159
Project Title: Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in PWS
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Rept		
Intrm		
Food for remote field camps: 6 people - 60 days @$10./day		$3.6
Boat fuel: 335 gals./day for 60 days (20,100 gals. @$1.50/gal.)		$30.1
Camp supplies (stove fuel, bug spray, etc.)		$0.8
Commodities Total	$0.0	$34.5
Equipment:		
Rept		
Intrm		
Safety equipment (floatation devices, VHF radios, etc.)		$5.0
Boat repair and equipment (anchor, propellers, canvas, etc.)		$12.0
Other equipment		$5.0
Computer and software (desktop 486PC)		$5.0
Equipment Total	$0.0	$27.0

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Project Number: 95159
Project Title: Surveys to Determine Additional Oil Spill Effects and Recovery of Marine Bird and Sea Otter Populations in PWS
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
DETAIL

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

Project Description: This project will concentrate on determining distribution, abundance, and availability of important prey species (e.g., herring, pollock sandlance, capelin, macrozooplankton, squid) to predatory species affected by the oil spill (i.e. harbor seals, pigeon guillemots, marbled murrelets, common murres, black-legged kittiwakes, and pink salmon). Diet overlap and prey selection among forage fish species will also be examined. This information, trophic position and niche overlap among species, will be used to establish the basic structure of future ecosystem models. The models of changing oceanographic regimes and prey species productivity and distribution would be necessary for understanding recovery of predatory species, and useful in guiding recovery activities.

Budget Category:	1994 Project No. 94163 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$144.4	$81.7	$218.1	$299.8	$70.4	
Travel	$19.0	$12.6	$13.7	$26.3	$6.6	
Contractual	$386.3	$78.3	$804.0	$882.3	$182.3	
Commodities	$5.0	$1.0	$7.4	$8.4	$2.8	
Equipment	$0.0	$3.5	$26.0	$29.5	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$554.7	$177.1	$1,069.2	$1,246.3	$262.1	
General Administration	$38.7	$17.7	$66.5	$84.2	$23.3	
Project Total	$593.4	$194.8	$1,135.7	$1,330.5	$285.4	
Full-time Equivalents (FTE)	3.0	1.1	4.9	6.0	0.5	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Agency: National Oceanic & Atmospheric Admin

FORM 2A PROJECT DETAIL

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

Project Description: This project will concentrate on determining distribution, abundance, and availability of important prey species (e.g., herring, pollock sandlance, capelin, macrozooplankton, squid) to predatory species affected by the oil spill (i.e. harbor seals, pigeon guillemots, marbled murrelets, common murres, black-legged kittiwakes, and pink salmon). Diet overlap and prey selection among forage fish species will also be examined. This information, trophic position and niche overlap among species, will be used to establish the basic structure of future ecosystem models. The models of changing oceanographic regimes and prey species productivity and distribution would be necessary for understanding recovery of predatory species, and useful in guiding recovery activities.

Budget Category:	1994 Project No. 94163 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$66.0	$42.8	$42.8	$85.6	$30.0	
Travel	$10.0	$9.0	$6.0	$15.0	$5.0	
Contractual	$350.0	$0.0	$700.0	$700.0	$0.0	
Commodities	$0.0	$1.0	$1.0	$2.0	$0.0	
Equipment	$0.0	$3.5	$6.0	$9.5	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$426.0	$56.3	$755.8	$812.1	$35.0	
General Administration	$29.4	$6.4	$32.9	$39.3	$4.5	
Project Total	$455.4	$62.7	$788.7	$851.4	$39.5	
Full-time Equivalents (FTE)	0.8	0.6	0.6	0.6	0.5	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Program Manager GS-12	4.0	$30.0	4.0	$30.0
Intrm	Fishery Biologist GS-9	3.0	$12.8	3.0	$12.8
	Personnel Total	7.0	$42.8	7.0	$42.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Sub-Project: Forage Fish Surveys
Agency: National Ocea & Atmospheric Admin

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	4 trips Juneau - Anchorage and return plus per diem @ $1,000/trip	$4.0	
	1 trip Juneau - Seattle and return @ $1,000/trip	$1.0	
	2 trips Juneau - Cordova @ $1,000/trip	$2.0	
	1 trip Juneau-Anchorage and return plus per diem @ $1,000/trip	$1.0	
	1 trip Juneau-Fairbanks and return @ $1,000/trip	$1.0	
Rem	4 trips Juneau - Anchorage and Prince William Sound @ $1,000/trip		$4.0
	2 trips Juneau-Cordova @ $1,000/trip		$2.0
	Travel Total	$9.0	$6.0
Contractual:			
Rept			
Rem	Contract for forage fish surveys including vessel costs for 3 months field work plus report writing in FY 96		$700.0
	Contractual Total	$0.0	$700.0

Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery on Injured Species
Sub-Project: Forage Fish Surveys
Agency: National Oceanic & Atmospheric Admin

FORM 3B
SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Miscellaneous lab supplies (vials, isopropanol, petri dishes, sample bottles, etc.)	$1.0	
Rem	Miscellaneous office supplies		$1.0
	Commodities Total	$1.0	$1.0
Equipment:			
Rept	1 Nikon binocular dissecting microscope with fiber optic light source	$3.5	
Rem	1 portable computer, modem, and printer		$6.0
	Equipment Total	$3.5	$6.0

Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Sub-Project: Forage Fish Surveys
Agency: National Ocea & Atmospheric Admin

FORM 3B
SUB-PROJECT
DETAIL

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

Project Description: This component of the project will examine diet overlap and prey selection among forage fish species in various habitats. The information obtained from the project will be used in future years to develop estimates of the carrying capacity of Prince William Sound for juvenile fishes including Pacific salmon. The project will achieve the following objectives in FY 95: (1) collect samples of forage fish for analysis of stomach contents as well as available prey in three habitat types during four time periods, (2) conduct laboratory analyses of epibenthic invertebrate/zooplankton samples and fish stomach contents, and (3) assess diet changes in prey composition and diet overlap among juvenile fishes.

Budget Category:	1994 Project No. 94163 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
						95 Report
Personnel	$20.0	$14.6	$36.0	$50.6	$40.4	$14.6
Travel	$1.0	$1.6	$0.0	$1.6	$1.6	$1.6
Contractual	$31.0	$78.3	$104.0	$182.3	$182.3	$78.3
Commodities	$5.0	$0.0	$2.8	$2.8	$2.8	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$57.0	$94.5	$142.8	$237.3	$227.1	$94.5
General Administration	$5.2	$7.7	$12.7	$20.4	$18.8	$7.7
Project Total	$62.2	$102.2	$155.5	$257.7	$245.9	$102.2
Full-time Equivalents (FTE)	0.4	0.2	0.8	1.0	0.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept				
Biometrician II	2.0	$10.4	0.0	$0.0
Fishery Biologist I	0.0	$0.0	2.0	$8.8
Fishery Biologist I	0.0	$0.0	2.0	$8.8
Fishery Technician II	0.0	$0.0	2.0	$6.2
Fishery Technician II	0.0	$0.0	2.0	$6.2
Program Manager	0.8	$4.2	1.0	$6.0
Personnel Total	2.8	$14.6	9.0	$36.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	2 roundtrip Cordova/Anchorage @ $0.25 + 7 days per diem	$1.6	
	Travel Total	$1.6	$0.0
Contractual:			
Rept	Laboratory analyses of stomach contents and epibenthic/zooplankton samples (3,250 samples @ $24/sample)	$78.0	$78.0
Rem	Air charter (4 trips from Cordova to study area)	$0.0	$2.0
	Vessel charter (20 days @ $1,200/day)	$0.0	$24.0
	4 camera ready copies and 32 bound copies of final report	$0.3	$0.0
	Contractual Total	$78.3	$104.0

Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Field sampling supplies		
Food for 4 people for 20 days @ $20/day/person		$1.6
Outboard fuel and oil		$0.4
Scientific supplies		
Formaldehyde (4x4L), sample bottles, rite in rain paper		$0.8
Commodities Total	$0.0	$2.8

Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will concentrate on determining distribution, abundance, and availability of important prey species (e.g., herring, pollock sandlance, capelin, macrozooplankton, squid) to predatory species affected by the oil spill (i.e. harbor seals, pigeon guillemots, marbled murrelets, common murres, black-legged kittiwakes, and pink salmon). Diet overlap and prey selection among forage fish species will also be examined. This information, trophic position and niche overlap among species, will be used to establish the basic structure of future ecosystem models. The models of changing oceanographic regimes and prey species productivity and distribution would be necessary for understanding recovery of predatory species, and useful in guiding recovery activities.

Budget Category:	1994 Project No. 94163 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$58.4	$24.3	$139.3	$163.6		
Travel	$8.0	$2.0	$7.7	$9.7		
Contractual	$5.3	$0.0	$0.0	$0.0		
Commodities	$0.0	$0.0	$3.6	$3.6		
Equipment	$0.0	$0.0	$20.0	$20.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$71.7	$26.3	$170.6	$196.9	$0.0	
General Administration	$4.1	$3.6	$20.9	$24.5	$0.0	
Project Total	$75.8	$29.9	$191.5	$221.4	$0.0	
Full-time Equivalents (FTE)	1.8	0.6	3.8	4.4		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Project Leader, GS - 11	3.0	$12.9	15.0	$64.3
Bio. Tech., GS - 5	3.0	$5.9	24.0	$48.0
Expediter	0.0	$0.0	3.0	$10.0
Project Manager	1.0	$5.5	2.0	$11.0
Program Manager	0.0	$0.0	1.0	$6.0
Personnel Total	7.0	$24.3	45.0	$139.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95163

Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species

Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Intrm	Interim travel is for workshops and coordination meetings with related forage fish project investigators This may inlcude trvel from Anchorage to Cordova or other Alaska communities	$2.0	
	Field camp: Transport gear and personnel from Anchorage through Whittier to Prince William Sound 4 people - 6 trips @$100/trip		$2.4
	Field per diem: 4 people - 90 days each @ $3/day		$1.1
	Anchorage to Cordova/Valdez: travel for additional field personnel (e.g., substitutes, resupply, supervision)		$4.2
	Travel Total	$2.0	$7.7
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	Food for remote field camps: 4 people - 90 days each @ $10/day		$3.6
	Commodities Total	$0.0	$3.6
Equipment:			
Rept			
Intrm	Safety equipment (flotation devices, emergency locator beacons)		$5.0
	Binoculars		$5.0
	Computers and software - 486 notebook for field data entry (2)		$10.0
	Equipment Total	$0.0	$20.0

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Project Number: 95163
Project Title: Abundance & Distribution of Forage Fish & their Influence on Recovery of Injured Species
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 3B
SUB-PROJECT DETAIL

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

Project Description: This project is a pilot study to develop genetic techniques to assess stock differentiation of herring in Prince William Sound, and will include both allozyme and DNA studies. Incorporating genetically derived stock structure is crucial to the success of any fisheries or restoration program and will allow resource managers to redirect commercial harvest away from injured herring stocks as well as help to interpret oil spill damage results.

Budget Category:	1994 Project No. 94165 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$20.0	$0.0	$30.6	$30.6	$40.0
Travel	$1.0	$0.0	$2.0	$2.0	$3.0
Contractual	$31.0	$0.0	$60.5	$60.5	$61.0
Commodities	$5.0	$0.0	$3.5	$3.5	$4.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$57.0	$0.0	$96.6	$96.6	$108.0
General Administration	$5.2	$0.0	$8.8	$8.8	$10.3
Project Total	$62.2	$0.0	$105.4	$105.4	$118.3
Full-time Equivalents (FTE)		0.0	0.5	0.5	

Dollar amounts are shown in thousands of dollars.

Comment	96 Field	95 Report
Personnel	$24.6	$15.4
Travel	$2.0	$1.0
Contractual	$60.5	$0.5
Commodities	$3.5	$0.5
Equipment	$0.0	$0.0
Capital Outlay	$0.0	$0.0
Subtotal	$90.6	$17.4
General Administration	$7.9	$2.3
Project Total	$98.5	$19.7

This project was funded in FFY94, however, was not put into the field due to low returns of herring to Prince William Sound.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rem	Fishery Biologist II	0.0	$0.0	3.0	$16.8
	Fish and Wildlife Technician II	0.0	$0.0	2.5	$7.8
	Program Manager	0.0	$0.0	1.0	$6.0
	Personnel Total	0.0	$0.0	6.5	$30.6

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95165
Project Title: PWS Herring Genetic Stock Identification
Agency: AK Dept. of Fish & Game

FORM 2A
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rem	2 RT to contract labs @ approximately $0.7 + 4 days per diem	$0.0	$2.0
	Travel Total	$0.0	$2.0
Contractual:			
Rem	Contract for molecular genetics	$0.0	$60.0
	Long distance phone charges	$0.0	$0.2
	Liquid nitrogen	$0.0	$0.1
	Gel photography	$0.0	$0.1
	Freight and shipping	$0.0	$0.1
	Contractual Total	$0.0	$60.5

Project Number: 95165
Project Title: PWS Herring Genetic Stock Identification
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rem	Allozyme chemicals	$0.0	$2.0
	Film	$0.0	$0.3
	Sampling supplies (forceps, containers, etc.)	$0.0	$0.6
	Laboratory supplies	$0.0	$0.6
	Commodities Total	$0.0	$3.5
Equipment:			
Rem		$0.0	$0.0
	Equipment Total	$0.0	$0.0

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Project Number: 95165
Project Title: PWS Herring Genetic Stock Identification
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Herring Natal Habitats - This project is designed to aid restoration of PWS herring resources through intensive management of commercial use. Scuba surveys are conducted to quantify herring spawn in areas of spawn identified through aerial surveys. Estimates of deposited spawn are combined with other biological information (age, sex, size, fecundity, etc.) to estimate the biomass of reproducing herring. Biomass estimates are used to forecast future returns and set harvest allocations.

Budget Category:	1994 Project No. 94166 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 95 Interim	94 Report	96 Field	95 Report
Personnel	$259.5	$83.6	$112.1	$195.7	$266.9	$12.1	$71.5	$224.8	$42.1
Travel	$7.9	$2.0	$2.8	$4.8	$5.8	$0.0	$2.0	$4.8	$1.0
Contractual	$114.9	$131.1	$117.5	$248.6	$122.0	$3.6	$127.5	$120.0	$2.0
Commodities	$33.1	$0.2	$11.7	$11.9	$12.2	$0.0	$0.2	$12.0	$0.2
Equipment	$3.9	$0.0	$5.1	$5.1	$2.0	$0.0	$0.0	$2.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$419.3	$216.9	$249.2	$466.1	$408.9	$15.7	$201.2	$363.6	$45.3
General Administration	$47.0	$21.7	$25.0	$46.7	$48.6	$2.1	$19.7	$42.1	$6.5
Project Total	$466.3	$238.6	$274.2	$512.8	$457.5	$17.8	$220.9	$405.7	$51.8
Full-time Equivalents (FTE)		1.3	2.2	3.5					

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
1 Fishery Biologist III (2 months Interim)	5.0	$30.3	1.0	$6.0
3 Fishery Biologist II	3.0	$15.8	6.0	$31.0
1 Fisheries Technician III	0.0	$0.0	5.0	$20.9
4 Fisheries Technician II	0.0	$0.0	9.0	$30.6
1 Biometrician I	3.0	$14.3	3.0	$14.4
1 Research Analyst II	4.0	$19.0	0.0	$0.0
1 Field Office Assistant	0.0	$0.0	1.0	$3.2
Program Manager	0.8	$4.2	1.0	$6.0
Personnel Total	15.8	$83.6	26.0	$112.1

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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

		Reprt/Intrm	Remaining
Travel:			
	Spawn Deposition:		
Reprt94	4 RT Cordova/Anchorage ($350 airfare + 4 days per diem)	$2.0	
Field95	1 RT Homer/Cordova ($500 airfare + 2 days per diem)		$0.8
Field95	4 RT Cordova/Anchorage ($350 airfare + 4 days per diem)		$2.0
	Travel Total	$2.0	$2.8
Contractual:			
	Spawn Deposition:		
Reprt94	Publication Costs (FY94 reporting in FY95)	$2.0	
Reprt94	GIS Spawn Mapping and Analysis (Digitize 1973-94 maps, model spawner density and habitat selection)	$36.0	
Intrm	Dive Master Class (2 @ $400)	$0.8	
Intrm	Dive Physicals (6 @ $300/diver)	$1.8	
Intrm	CPR Training	$0.4	
Field95	Network Op/Maint.	$0.5	
Field95	Hazmat Disposal		$0.5
Field95	Vessel Charter (35 days @ 1400/d)		$49.0
Field95	Skiff Fuel		$0.4
Field95	Aircraft Charter (3 @ $200)		$0.6
Field95	Skiff Rep/Maint.		$0.7
Field95	Dive Equip Rep/Maint.		$1.0
Field95	Ship/Postage		$0.3
	Egg Loss:		
Reprt94	Embryo Survival and Recruitment Modeling (RSA with UAJ for data analysis and report)	$80.0	
Reprt94	Cytogentic Sample Processing Subcontract (300 1994 samples process + data analysis)	$9.0	
Intrm	Dive Physicals (2 @ $300/diver)	$0.6	
Field95	Cytogentics Egg Incubation Subcontract (Lab rear eggs to hatch, sample process baseline cytogen abnorm)		$50.0
Field95	Vessel Charter (15 days @ 1000/d)		$15.0
	Contractual Total	$131.1	$117.5

Project Number: 95166
Project Title: Herring Natal Habitats
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
	Spawn Deposition:		
Reprt94	Software Upgrades	$0.2	
Field95	Bouyancy Control Devices		$1.6
Field95	Dive Gear Replacement/Parts		$1.1
Field95	Office /Lab Supplies		$1.0
Field95	Acid Pipettor		$0.5
Field95	Food for field crew (8 people x 25 days @ $15/day)		$3.0
Field95	Field Supplies		$1.0
Field95	Skiff Repair/Parts		$1.5
	Egg Loss:		
Field95	Food for field crew (8 people x 12 days @$15/day)		$1.5
Field95	Sampling Supplies		$0.5
	Commodities Total	$0.2	$11.7
Equipment:			
	Spawn Deposition:		
Field95	Chemical Storage Locker		$1.5
Field95	Tank Tumbler (reduces future gear maintenance and shipping costs)		$1.2
Field95	Dive Gear Replacement (Replace 2 wornout dry suits)		$2.4
	Equipment Total	$0.0	$5.1

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Project Number: 95166
Project Title: Herring Natal Habitats
Agency: AK Dept of Fish & Game

FORM 2B
PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This study continues the 1994 work on Pigeon Guillemot Recovery Monitoring (94173) which was an extensive survey of Pigeon Guillemot colonies in PWS. The purpose of this project is to determine whether food, predation, direct toxicity from oil, or adult mortality is limiting the recovery of the pigeon guillemot population in PWS. Information on the abundance and distribution of schooling fish collected by the forage fish project (94163), in conjunction with our own studies of the guillemots' diet and foraging habits, will help us address the question of food as the limiting factor. The project location is Naked Island and one other site. '94 Report/'95 Interim costs are for analyzing data and writing the report for work conducted in FY94 under 94173. FFY 95 costs include data analysis and report writing.

Budget Category:	1994 Project No. 94173 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$132.0	$47.0	$185.0	$232.0	$190.6	FY97 $366.7K ($360.1K + 3% increase for personnel)
Travel	$5.7	$1.0	$10.0	$11.0	$10.0	
Contractual	$23.6	$0.0	$85.0	$85.0	$85.0	FY98 $373.5K ($366.7K + 3% increase for personnel)
Commodities	$13.3	$0.0	$15.0	$15.0	$15.0	
Equipment	$5.0	$0.0	$25.0	$25.0	$25.0	FY99 $380.5K ($373.5K + 3% increase for personnel)
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$179.6	$48.0	$320.0	$368.0	$325.6	
General Administration	$21.5	$7.1	$33.7	$40.8	$34.5	
Project Total	$201.1	$55.1	$353.7	$408.8	$360.1	
Full-time Equivalents (FTE)	2.9	1.0	5.3	6.3	5.3	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept GIS Tech., GS-9	4.0	$13.0		
Project Leader, GS-11	4.0	$23.0	14.0	$62.1
Bio. Tech., GS-6	4.0	$11.0	14.0	$36.5
Bio. Tech., GS-5 (4)			30.0	$59.4
Expediter			3.0	$10.0
Project Manager			2.0	$11.0
Program Manager			1.0	$6.0
Personnel Total	12.0	$47.0	64.0	$185.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95173

Project Title: Factors Affecting the Recovery of PWS Pigeon Guillemot Populations

Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	Interim costs include travel associated with workshops and meetings	$1.0	
	Anchorage to Whittier: Boat transport from storage to field - 4 trips @$1200./trip		$4.8
	Anchorage to Whittier: to mobilize and demobilize the field camps; 6 people - 3 trips @$100./trip		$1.8
	Field per diem: 6 people - 110 days @$3./day		$2.0
	Anchorage to Cordova/Valdez: travel for additional field personnel (e.g., substitutes, resupply, supervision) 4 trips @$360./trip		$1.4
	Travel Total	$1.0	$10.0
Contractual:			
Rept			
	Hydrocarbon analysis of 10 unhatched eggs		$10.0
	Fuel delivery to PWS - 2 trips @$5K/trip		$10.0
	Safety training - 6 people @$830./person (e.g., Watercraft safety, Marine survival, First aid, CPR, Bear safety, Firearms safety)		$5.0
	Warehouse rental (equipment and boat storage)		$2.5
	Truck rental (to transport boat from storage to field, transport personnel)		$2.5
	Assess nearshore benthic fishes (contract for bid, not done yet)		$55.0
	Contractual Total	$0.0	$85.0

Project Number: 95173

Project Title: Factors Affecting the Recovery of PWS Pigeon Guillemot Populations

Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Rept		
Food for remote field camps: 6 people - 110 days @$10./day/person (660 person days)		$6.6
Boat Fuel: 100 gals./day for 50 days (5000 gals. @$1.50/gal)		$7.5
Camp supplies (stove fuel, bug spray, etc.)		$0.9
Commodities Total	$0.0	$15.0
Equipment:		
Rept		
Safety equipment (floatation devices, VHF radios, etc.)		$5.0
Boat repair and equipment (anchor, propeller, canvas, rafts, outboards, etc.)		$10.0
Camp equipment (stoves, tents, lanterns, etc.)		$5.0
Other equipment (video cameras, writing materials, etc.)		$5.0
Equipment Total	$0.0	$25.0

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Project Number: 95173
Project Title: Factors Affecting the Recovery of PWS Pigeon Guillemot Populations
Agency: Dept. of Interior, Fish & Wildlife Service

FORM 2B
PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project recovers coded wire tags from adult pink salmon that were tagged as fry emerging from four hatcheries in PWS. The project uses tag recovery data to make estimates of catch contributions, total returns, and marine survival rates for wild and hatchery fish. Inseason catch contribution estimates for wild and hatchery fish enable managers to modify fishing patterns by time and area to reduce fishing pressure on injured wild returns. The project is funded by the AK Dept. of Fish and Game, Prince William Sound Aquaculture Corporation, Valdez Fisheries Development Association, and the EVOS Trustee Council.

Budget Category:	1994 Project No. 94191 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment	
						96 Field	95 Report
Personnel	$309.4	$51.0	$127.6	$178.6	$227.4	$175.1	$52.3
Travel	$16.4	$2.3	$10.1	$12.4	$12.8	$12.0	$0.8
Contractual	$101.4	$3.2	$23.4	$26.6	$29.8	$26.6	$3.2
Commodities	$33.0	$0.0	$14.7	$14.7	$14.7	$14.7	$0.0
Equipment	$2.0	$4.0	$0.0	$4.0	$4.0	$4.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$462.2	$60.5	$175.8	$236.3	$288.7	$232.4	$56.3
General Administration	$44.1	$7.9	$20.8	$28.7	$36.2	$28.1	$8.1
Project Total	$506.3	$68.4	$196.6	$265.0	$324.9	$260.5	$64.4
Full-time Equivalents (FTE)	4.6	0.9	2.9	3.8			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	Comment
Rept	Fishery Biologist II	2.0	$10.4	0.0	$0.0	
	Fishery Biologist I	1.5	$6.2	3.0	$14.3	$1.8 OT
	Biometrician I	3.0	$15.2	2.0	$10.1	
	Data Analyst	1.0	$5.4	0.0	$0.0	
Rem	Analyst Programmer	0.0	$0.0	3.0	$15.3	
16	Fish and Wildlife Technician II & III	3.0	$9.6	24.8	$78.2	$11.7 OT
	Field Office Assistant	0.0	$0.0	1.0	$3.7	
	Program Manager	0.8	$4.2	1.0	$6.0	
	Personnel Total	11.3	$51.0	34.8	$127.6	

Other Contributions to this project

	ADF&G	PWSAC	VFDA
	$81.6	$100.0	$26.2
	$0.0	$0.0	$0.0
	$0.0	$0.0	$0.0
	$0.0	$0.0	$0.0
	$0.0	$0.0	$0.0
	$81.6	$100.0	$26.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95191A

Project Title: Investigating and Monitoring Oil Related Egg and Alevin Mortalities

Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	4 RT Cordova/Anchorage @ $0.2 +10 days per diem	$2.3	$0.0
Rem	4 RT Cordova/Whittier @ $0.2 +12 days per diem	$0.0	$2.6
	3 RT Cordova/Kodiak @ $0.5 + 10 days per diem	$0.0	$3.0
	5 RT Cordova/Anchorage @ $0.2 + 11 days per diem	$0.0	$2.7
	2 RT Cordova/Kenai @ $0.3 + 8 days per diem	$0.0	$1.8
	Travel Total	$2.3	$10.1
Contractual:			
Rept	Air charters to hatcheries for bood stock sampling 4 trips @ $0.5	$2.0	$0.0
	DOT fleet vehicle rental 2 months @ $0.6	$1.2	$0.0
Rem	Air charters to hatcheries and Valdez 40 hours @ approximately $0.3		$12.2
	Temporary field office rental (Valdez) for 3 months @ $1.0		$3.0
	Dot fleet vehicle rental 2 vehicles for 4 months @ $0.4		$3.2
	Air freight of supplies, data and heads to and from the tag lab		$4.0
	Computer and tag detector maintenance		$1.0
	Contractual Total	$3.2	$23.4

Project Number: 95191A

Project Title: Investigating and Monitoring Oil Related Egg and Alevin Mortalities

Agency: AK Dept. of Fis[illegible] Game

FORM 2B PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
	Rain gear, gloves, and boots for 13 people @ $0.3		$3.9
	CWT recovery sample kits for 13 people @ approximately $0.45		$5.9
	Tag lab supplies		$4.4
	Misc. field supplies		$0.5
	Commodities Total	$0.0	$14.7
Equipment:			
Rept	Computer upgrade for CWT analyses	$4.0	
	Equipment Total	$4.0	$0.0

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Project Number: 95191A
Project Title: Investigating and Monitoring Oil Related Egg and Alevin Mortalities
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Oil Related Egg and Alevin Mortalities - The NOAA/NMFS portion of the egg mortality study provides laboratory verification that field results observed for eggs in 1989, 1990, and 1991 are consistent with immediate lethal effects as well as persistent genetic damage caused by oil deposited in intertidal pink salmon spawning habitat.

Budget Category:	1994 Project No. 94191 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$213.7	$124.7	$89.0	$213.7	$93.5	The Report/Interim portion incorporates interim/continuing cost of $45.0.
Travel	$21.4	$8.5	$24.0	$32.5	$12.5	
Contractual	$50.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$38.5	$13.5	$32.2	$45.7	$13.5	
Equipment	$15.0	$0.0	$7.0	$7.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$338.6	$146.7	$152.2	$298.9	$119.5	
General Administration	$35.6	$18.7	$13.4	$32.1	$14.0	
Project Total	$374.2	$165.4	$165.6	$331.0	$133.5	
Full-time Equivalents (FTE)	4.4	2.4	1.6	4.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project Leader GS - 11	7.0	$34.9	5.0	$24.8
Chemist GS - 11	7.0	$34.9	5.0	$24.8
Fish Biologist GS - 9	7.0	$28.0	5.0	$27.6
Fish Biologist GS - 7	7.0	$22.5	0.0	$0.0
Biol. Tech. GS - 5	0.0	$0.0	3.5	$8.7
Program Manager GS - 12	0.9	$4.4	0.6	$3.1
Personnel Total	28.9	$124.7	19.1	$89.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95191B

Project Title: Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oil Gravel (Laboratory Study)

Agency: National Oceanic & Atmospheric Admin

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept Intrm	6 roundtrip Juneau to Anchorage for workshop, meetings for P.I./staff Airfare $450: total 19d perdiem @ $225	$1.5	$5.6
	Travel to field station at Little Port Walter		
	8 trips: airfare @ $800/: 120 d perdiem @ $3	$7.0	
	18 trips: airfare @ $800/: 300 d perdiem @ $3		$15.3
	2 roundtrip to Washington (state) for Pink and Chum Salmon Workshop Airfare $725: 10 d @ $160/		$3.1
	Travel Total	$8.5	$24.0
Contractual:			
	Contractual Total	$0.0	$0.0

Project Number: 95191B
Project Title: Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oil Gravel (Laboratory Study)
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Fish food	$3.0	$2.0
Field supplies (fuel, nets, float material)	$3.0	$14.4
Groceries for field staff		
1 staff 365 d @ $12	$2.6	$1.8
Other staff trips, varying stays: 120 d @ $12/	$0.5	$1.0
Office supplies, primarily consumables	$0.8	$0.5
Chemistry laboratory supplies		
consummables, glassware, equipment parts, etc.	$2.2	$6.0
solvents, reagents for sample processing	$1.4	$5.0
Protective, safety clothing	$0.0	$1.5
Commodities Total	$13.5	$32.2
Equipment:		
Fish incubators (3 Heath Stacks)		$7.0
Equipment Total	$0.0	$7.0

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Project Number: 95191B
Project Title: Injury to Salmon Eggs and Pre-emergent Fry Incubated in Oil Gravel (Laboratory Study)
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project is a continuation of the NEPA compliance, planning, and design of a center for the long-term research and restoration of injured species, particularly for marine mammals and marine birds. This project will complete the Record of Decision addressing the environmental impacts of the proposed improvements, and will facilitate Trustee Council involvement in the design and construction of the facility, the development of an operating structure and organization, and development of a research program that is consistent with the restoration plan.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$122.3	$29.3	$0.0	$29.3	$0.0	
Travel	$20.0	$10.1	$0.0	$10.1	$0.0	
Contractual	$4.0	$1.9	$0.0	$1.9	$0.0	
Commodities	$0.7	$0.6	$0.0	$0.6	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay		See comments				
Subtotal	$147.0	$41.9	$0.0	$41.9	$0.0	
General Administration	$0.0	$4.6	$0.0	$4.6	$0.0	
Project Total	$147.0	$46.5	$0.0	$46.5	$0.0	
Full-time Equivalents (FTE)	$1.4	0.4	0.0	0.4		Budget for FFY 96 is unknown at this time
	Dollar amounts are shown in thousands of dollars.					Financial support for proposed improvements was approved on January 31, 1994 subject to NEPA compliance, review of assumptions relating to the proposed improvements and capital and operating budgets, and development of integrated funding approach. Capital funding level recommendations to be developed by Executive Director for further consideration by the Trustee Council.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Intrm Rem See personnel breakout on individual spreadsheets for each agency.				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95199
Project Title: Institute of Marine Science Seward Improvements
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Project Description: This project is a continuation of the NEPA compliance, planning, and design of a center for the long-term research and restoration of injured species, particularly for marine mammals and marine birds. This project will complete the Record of Decision addressing the environmental impacts of the proposed improvements, and will facilitate Trustee Council involvement in the design and construction of the facility, the development of an operating structure and organization, and development of a research program that is consistent with the restoration plan.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$48.3	$18.8	$0.0	$18.8	$0.0
Travel	$5.0	$4.8	$0.0	$4.8	$0.0
Contractual	$4.0	$1.9	$0.0	$1.9	$0.0
Commodities	$0.7	$0.6	$0.0	$0.6	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$58.0	$26.1	$0.0	$26.1	$0.0
General Administration	$0.0	$3.0	$0.0	$3.0	$0.0
Project Total	$58.0	$29.1	$0.0	$29.1	$0.0
Full-time Equivalents (FTE)	0.7	0.2	0.0	0.2	
Dollar amounts are shown in thousands of dollars.					

Comment	94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$18.8	$0.0	
Travel	$0.0	$4.8	$0.0	
Contractual	$0.0	$1.9	$0.0	
Commodities	$0.0	$0.6	$0.0	
Equipment	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	
Subtotal	$0.0	$26.1	$0.0	$0.0
General Administration	$0.0	$3.0	$0.0	$0.0
Project Total	$0.0	$29.1	$0.0	$0.0

Budget for FFY 96 is unknown at this time

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm	Habitat Biologist IV	2.3	$15.8	0.0	$0.0
Intrm	Program Manager	0.5	$3.0	0.0	$0.0
Rem					
	Personnel Total	2.8	$18.8	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	3 RT Juneau/Anchorage @ $450 + 8 days per diem	$2.6	$0.0
	2 RT Fairbanks/Anchorage @ $250 + 3 days per diem	$1.0	$0.0
	1 RT Cordova/Anchorage @ $250 + 2 days per diem	$0.6	$0.0
	5 RT Anchorage/Seward via State Vehicle	$0.0	$0.0
	1 RT Kodiak/Anchorage @ $250 + 2 days per diem	$0.6	$0.0
	Travel Total	$4.8	$0.0
Contractual:			
Intrm	Film processing	$0.5	$0.0
Intrm	Long distance phone charges	$0.5	$0.0
Intrm	Copying charges	$0.2	$0.0
	Computer and printer repairs	$0.6	$0.0
	CompuServe charges	$0.1	$0.0
	Contractual Total	$1.9	$0.0

Project Number: 95199
Project Title: Seward Institute of Marine Science Improvements
Agency: AK Dept. of Fish & Game

FORM 3B SUB PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
		$0.0	$0.0
Intrm	Office supplies (paper, pens,etc.)	$0.2	$0.0
	Film	$0.2	$0.0
	Computer diskettes	$0.2	$0.0
	Commodities Total	$0.6	$0.0
Equipment:		$0.0	$0.0
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95199
Project Title: Institute of Marine Science Seward Improvements
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project is a continuation of the NEPA compliance, planning, and design of a center for the long-term research and restoration of injured species, particularly for marine mammals and marine birds. This project will complete the Record of Decision addressing the environmental impacts of the proposed improvements, and will facilitate Trustee Council involvement in the design and construction of the facility, the development of an operating structure and organization, and development of a research program that is consistent with the restoration plan.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$74.0	$10.5	$0.0	$10.5	$0.0	$0.0	$10.5	$0.0	
Travel	$15.0	$5.3	$0.0	$5.3	$0.0	$0.0	$5.3	$0.0	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$89.0	$15.8	$0.0	$15.8	$0.0	$0.0	$15.8	$0.0	$0.0
General Administration	$0.0	$1.6	$0.0	$1.6	$0.0	$0.0	$1.6	$0.0	$0.0
Project Total	$89.0	$17.4	$0.0	$17.4	$0.0	$0.0	$17.4	$0.0	$0.0
Full-time Equivalents (FTE)	0.7	0.2	0.0	0.2		Budget for FFY 96 is unknown at this time			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Supervisory Env. Scientist GM-13	1.5	$9.6	0.0	$0.0
Intrm Secretary (GS-5)	0.3	$0.9	0.0	$0.0
Rem				
Personnel Total	1.8	$10.5	0.0	$0.0

There are funds leftover in the FFY94 allocation. If those funds are rolled over and made available for FFY95 use, then this request for FFY 95 is not needed.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95199
Project Title: Institute of Marine Science Seward Improvements
Agency: Dept. of Interior, Mineral Management Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	1 RT Anchorage/Washington D.C @ $800 + 4.5 days per diem @ $113	$1.3	$0.0
	2 RT Washington D.C./Anchorage @ *00 +10 days per diem @ $81/day	$3.0	$0.0
	2 RT Anchorage/Seward @ $90/trip + 1.5 days per diem/trip @ $90	$0.3	
	1 RT Anchorage/Juneau @ $435 + 1.5 days per diem @ $78	$0.7	
	Travel Total	$5.3	$0.0
Contractual:			
Intrm		$0.0	$0.0
Intrm			
Intrm			
	Contractual Total	$0.0	$0.0

Project Number: 95199
Project Title: Institute of Marine Science Seward Improvements
Agency: Dept. of Interior, Mineral Management Service

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95199
Project Title: Institute of Marine Science Seward Improvements
Agency: Dept. of Interior, Mineral Management Service

FORM 3B
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PROJECT
DETAIL

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

Project Description: Public Access

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$30.0	$30.0	$160.0	Total project cost is 797.7 over a 4 year period
Travel		$0.0	$3.0	$3.0	$30.0	
Contractual		$0.0	$10.0	$10.0	$30.0	
Commodities		$0.0	$2.0	$2.0	$5.0	
Equipment		$0.0	$0.0	$0.0	$5.0	
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$45.0	$45.0	$230.0	
General Administration		$0.0	$5.2	$5.2	$26.1	
Project Total	$0.0	$0.0	$50.2	$50.2	$256.1	
Full-time Equivalents (FTE)		0.0	0.4	0.4		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Lands Specialist			2.0	$10.0
Survey Crew (2)			3.0	$20.0
Personnel Total	0.0	$0.0	5.0	$30.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95200
Project Title: Public Access
Agency: USDA Forest Service

FORM 3A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel		$3.0
Travel Total	$0.0	$3.0
Contractual:		
Rept		
Intrm Contractual		$10.0
Contractual Total	$0.0	$10.0

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Project Number: 95200
Project Title:Public Access
Agency:USDA Forest Service

FORM 3B
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Intrm Supplies		$2.0
Commodities Total	$0.0	$2.0
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95200
Project Title: Public Access
Agency: USDA Forest Service

FORM 3B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The goal of this project is to assess the available data about the relationship between population dynamics and trends and subsistence harvests of harbor seals and sea otters, to work cooperatively with subsistence hunters to assess the relationship between these factors and the recovery of these species.

Budget Category:	1994 Project No. 95244 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment	
						95 Interim	94 Report
Personnel	$32.0	$32.2	$20.5	$52.7	$18.1	$0.0	$32.0
Travel	$5.0	$14.0	$5.0	$19.0	$0.0	$4.0	$10.0
Contractual	$10.0	$1.0	$11.0	$12.0	$1.0	$0.0	$1.0
Commodities	$0.8	$0.5	$1.0	$1.5	$0.2	$0.0	$0.5
Equipment	$1.2	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$49.0	$47.7	$37.5	$85.2	$19.3	$4.0	$43.5
General Administration	$5.5	$4.9	$3.8	$8.7	$2.8	$0.0	$4.9
Project Total	$54.5	$52.6	$41.3	$93.9	$22.1	$4.0	$48.4
Full-time Equivalents (FTE)	0.5	5.0	3.0	8.0	2.5		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Subsistence Resource Specialist II	1.0	$4.3	2.0	$8.6
	Subsistence Resource Specialist III	2.0	$10.9	1.0	$5.9
	Subsistence Regional Program Mgr.	1.0	$7.3	0.0	$0.0
	Research Analyst III	1.0	$5.5	0.0	$0.0
	Program Manager	0.8	$4.2	1.0	$6.0
	Personnel Total	5.8	$32.2	4.0	$20.5

FFY 96 request is for report writing cost only.

The interim request is for rollover authority for funds that were approved by the Trustee Council in FFY94 and will be used in the fall of FFY95.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95244
Project Title: Seal & Sea Otter Cooperative Harvest Assistance
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Ad hoc Review Committee meeting in Anchorage attended by marine mammal biologists and community representatives.	$10.0	$0.0
	4 RT Homer-Port Graham &Nanwalek @ $100/RT		
	4 RT Anchorage-Homer @ $100/RT		
	2 RT Chenega-Anchorage @ $900/RT		
	3 RT Tatitlek-Anchorage @ $550/RT		
	3 RT Anchorage-Cordova @ $204/RT		
	4 RT Anchorage-Fairbanks @ $386/RT + $600 per diem		
	1 RT Anchorage-Juneau @ $444/RT + $150 per diem		
	2 RT Anchorage-Seattle @ $970/RT + $300 per diem		
	1 RT Anchorage-Valdez @ $160/RT		
Intr	2 RT Fairbanks/Anchorage @ $0.4 + per diem $150	$4.0	$0.0
	2 RT Kodiak/Anchorage @ $0.2 + per diem $150		
	1 RT Chenega Bay/Anchorage @ $0.9 + per diem $150		
	1 RT Tatitlek/Anchorage @ $0.5 + per diem $150		
	1 RT Cordova/Anchorage @ $0.2 + per diem $150		
	1 RT Port Graham/Anchorage @ $ 0.2 + per diem $150		
	1 RT Nanwalek/Anchorage @ $0.2 + per diem $150		
Rem	Community meetings to review second year's data and Ad hoc sub-committee meetings	$0.0	$5.0
	2 RT Homer-Port Graham &Nanwalek @ $100/RT		
	2 RT Anchorage-Homer @ $100/RT		
	2 RT Chenega-Anchorage @ $900/RT		
	2 RT Tatitlek-Anchorage @ $550/RT + $300 per diem		
	1 RT Anchorage-Cordova @ $204/RT		
	1 RT Anchorage-Fairbanks @ $386/RT + $600 per diem		
	1 RT Anchorage-Valdez @ $160/RT		
	Travel Total	$14.0	$5.0
Contractual:			
Rept	Sea Otter Commission Cooperative Agreement (for data compilation and analysis)	$0.0	$5.0
	Newsletter production (3 editions)	$0.0	$5.0
	Report printing	$1.0	$1.0
	Contractual Total	$1.0	$11.0

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Project Number: 95244
Project Title: Seal & Sea Otter Cooperative Harvest Assistance
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Misc. office supplies	$0.5	$1.0
	Commodities Total	$0.5	$1.0
Equipment:			
Rept			
Intrm		$0.0	$0.0
	Equipment Total	$0.0	$0.0

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Project Number: 95244
Project Title: Seal & Sea Otter Cooperative Harvest Assistance
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Kenai River Sockeye Salmon Restoration- This project is a continuation of 94255 and a merger with 94504 (Genetic Stock Identification of Kenai River Sockeye Salmon). Its goal is to restore depressed Kenai River sockeye stocks by directing fisheries away from impacted stocks and allowing fishing on healthy stocks. This objective is accomplished through improved stock identification capabilities using analyses of genetic data and improved stock assessment capabilities using hydroacoustics.

Budget Category:	1994 Project No. 94255+94504 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	Comment Interim	Comment 95 Report
Personnel	$394.5	$260.0	$122.4	$382.4	$360.0	$245.7	$14.3	$174.5
Travel	$21.1	$8.8	$8.5	$17.3	$18.0	$7.8	$1.0	$4.8
Contractual	$100.1	$16.0	$85.1	$101.1	$100.0	$11.0	$5.0	$6.0
Commodities	$62.4	$33.5	$25.3	$58.8	$55.0	$29.0	$4.5	$19.0
Equipment	$24.0	$14.0	$7.0	$21.0	$20.0	$12.0	$2.0	$2.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$602.1	$332.3	$248.3	$580.6	$553.0	$305.5	$26.8	$206.3
General Administration	$66.2	$40.1	$24.3	$64.4	$61.0	$37.6	$2.5	$26.6
Project Total	$668.3	$372.4	$272.6	$645.0	$614.0	$343.1	$29.3	$232.9
Full-time Equivalents (FTE)	8.8	5.9	2.8	8.7				

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept 4 Fisheries Biologists I-IV	13.5	$67.5	5.0	$22.7
Rept 2 Biometrician I and III	4.5	$26.1	1.0	$5.2
Rept 1 Field Office Assistant	2.0	$7.0	0.0	$0.0
Rept 3 Fisheries Tech. III	19.0	$63.8	6.0	$20.1
Rept 11 Fisheries Tech. II	27.0	$78.3	20.0	$62.4
Rept 1 Program Manager	0.5	$3.0	2.0	$12.0
Intrm 1 Fisheries Biologist I	1.0	$4.8	0.0	$0.0
Intrm 7 Fisheries Tech. II and III	3.0	$9.5	0.0	$0.0
Personnel Total	70.5	$260.0	34.0	$122.4

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95255
Project Title: Kenai River Sockeye Salmon Restoration
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Admin travel Anchorage/Kenai (6 rt @ 0.125 and $.05 meals/parking)	$1.0	
Intrm	Field travel Anchorage to Kenai (2 rt @ 0.125 and 3 days per diem 0.15/day)	$1.0	$4.5
	Meeting with contractor for hydroacoustic contractor (2 RT Soldotna/Seattle @500 ea per diem)		$2.0
Rept	Scientific meetings and Symposia (AFS-AK in Sitka and National AFS)	$0.9	$1.1
Rept	Anchorage-Juneau (4 rt @ $450 with 3 days per diem each = $0.9)	$3.6	$0.9
Rept	Anchorage-Soldotna (2 RT @$0.1 with 7 days per diem @0.15/day each) for winter workshops to discuss 94 results	$2.3	
	Travel Total	$8.8	$8.5
Contractual:			
	Freight, postage, etc.		$1.6
	Air charter for stock ID sampling (12 hours @ $0.5/hr)		$6.0
	Contract for Cook Inlet hydroacoustics survey for data collection, analysis, and final report		$50.0
Rept	Calling Card phone and computer communications	$3.5	$2.0
Rept	Computer, electronic and other repairs	$2.5	$0.9
Rept	Gel photography	$2.0	$0.5
Rept	Contract for DNA analysis	$0.0	$20.0
Rept	Lab equipment maintenance	$2.0	$0.5
Rept	Conference registration fees (AFS, ASA)	$1.0	
Intrm	Computer, electronic and other repairs	$1.0	
Intrm	Freight, postage, etc.	$1.6	
Intrm	Vehicle rental (1,200/month per vehicle)	$2.4	$3.6
	Contractual Total	$16.0	$85.1

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Publishing, copying, and computer supplies	$1.0	
Rept	Inventory and storage	$1.0	
Rept	Computer Supplies	$1.0	
Rept	Computer Software, licenses, and upgrades	$2.0	
Rept	Office supplies	$3.0	$1.0
Rept	Biochemicals	$18.0	$4.0
Rept	Misc. Lab supplies (tubes, pipettors, gel rigs, plasticware)	$3.0	
Intrm	Lab supplies for collection of genetic samples (cryovials, pipettes, boxes, scapels, liquid nitrogen)	$2.5	$13.1
Intrm	Fuel	$0.5	$1.2
Intrm	Field and fishery sampling supplies (groceries, camping, and safety supplies)	$1.5	$5.0
	Safety and operating supplies for inlet survey (floatcoat, boots, raingear)		$1.0
	Commodities Total	$33.5	$25.3
Equipment:			
	Replace one escapment sampling raft		$2.0
Intrm	Misc. replacements for boat, tent, safety, or camping equipment	$2.0	$2.0
Rept	Network equipment and electronic storage equipment	$2.0	
Rept	Freezer	$7.0	
Rept	DNA equipment	$3.0	$3.0
	Equipment Total	$14.0	$7.0

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Project Number: 95255
Project Title: Kenai River Sockeye Salmon Restoration
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project is a continuation of the effects of sockeye salmon overescapement on river and lake ecosystems on Kodiak Island and the Kenai Peninsula. Smolt numbers from the Kenai River, Akalura Lake and Red Rivers on Kodiak Island suggest major decreases in future sockeye salmon returns to both areas. These studies will monitor future smelt outmigrations a and the density of fry rearing in the nursery lakes. In addition, detailed investigations will be conducted to determine what factors, both biotic and abiotic, may have contributed to the decline in production. Budget reflects work changes based on spring 1994 preliminary findings.

Budget Category:	1994 Project No. 94258 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$602.8	$325.2	$369.5	$694.7	$602.8
Travel	$13.5	$11.3	$2.0	$13.3	$10.7
Contractual	$71.2	$46.1	$30.8	$76.9	$68.2
Commodities	$49.5	$22.5	$41.1	$63.6	$56.4
Equipment	$22.5	$28.0	$12.0	$40.0	$12.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$759.5	$433.1	$455.4	$888.5	$750.1
General Administration	$95.4	$52.0	$57.6	$109.6	$95.2
Project Total	$854.9	$485.1	$513.0	$998.1	$845.3
Full-time Equivalents (FTE)	11.0	4.5	8.9	13.4	4.4

Dollar amounts are shown in thousands of dollars.

Comment	94 Report	95 Interim	95 Report	96 Field
Personnel	$242.3	$82.9	$242.3	$360.5
Travel	$8.6	$2.7	$8.7	$2.0
Contractual	$39.6	$6.5	$37.4	$30.8
Commodities	$15.3	$7.2	$15.3	$41.1
Equipment	$0.0	$28.0	$0.0	$12.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0
Subtotal	$305.8	$127.3	$303.7	$446.4
General Administration	$39.1	$12.9	$39.0	$56.2
Project Total	$344.9	$140.2	$342.7	$502.6

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept 14 Kenai Limnologists I-III, FB I, Biom II	19.0	$119.1	34.2	$111.5
Rept 24 Kenai Comfish FB I-III, Tech II and IIIs	10.7	$62.0	55.5	$194.0
Rept 7 Kodiak Comfish FB I-FB III and Tech IIIs	7.0	$35.0	12.0	$47.1
Rept 2 Kodiak Develop. FB I-FBIII	4.0	$22.0	3.0	$7.9
Intrm 14 Kenai Limnologists I-III and Tech II and III	6.8	$30.2	0.0	$0.0
Intrm 24 Kenai Comfish FB I-III and Tech II and III	3.8	$43.9	0.0	$0.0
Intrm 9 Kodiak Comfish FB I-FB III and Tech III	2.0	$8.8	0.0	$0.0
Rept Program Manager	0.8	$4.2	1.5	$9.0
Personnel Total	54.1	$325.2	106.2	$369.5

There may be a reduction in the request for funds in the FFY96 field season as some components may no longer need to be monitored.

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95258
Project Title: Sockeye Salmon Overescapement
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Anchorage/Kenai 12 RT @ $125 + 3 days per diem	$2.0	
Rept	Scientific meetings and Symposia (AFS Sitka-AK and National Limnology & Oceanography meeting, Orlando, Fl)	$1.6	
Rept	Kodiak/Kenai 2 RT @ $ 0.4 + 4 days per diem	$1.4	
Rept	Anchorage/Juneau 4 RT @ $450 + 12 days per diem	$3.6	
Intrm	Field travel Kodiak/Kenai- Red Lake fish sampling, delta N15- air fare $0.9 + 12 days per diem	$2.7	
	Field travel Kodiak/Red Lake/ Akalura Lake 4 RT @$0.5		$2.0
	Travel Total	$11.3	$2.0
Contractual:			
Rept	Fry Lipid and N15 analysis contracts U of A (lipid- 833 samples @ $12, N15- 100 samples @ $100	$20.0	
Rept	Long distance telephone and toll costs 10 months @ $500, copying and binding- 50 copies @ $10)	$5.5	
Rept	DOT vehicle lease (10 months @ $470)	$4.7	
Rept	Computer equipment repair (4 hard drives @ $500, one motherboard @ $1.0)	$3.0	
Rept	Software maintenance and upgrades- SAS license, netware licenses upgrade	$2.9	
Rept	Postage (10 months @ $250), photo processing (25 rolls @ $20), messenger service ($0.5)	$3.5	
Intrm	Radio repair- 4 radios @ $500	$2.0	
Intrm	Conference registrations	$0.5	
Intrm	Scientific equipment repair - autoanalyzer replacement, new standards, water conditioner	$4.0	
	Propane (275 gallons X $1.80/gallon)		$0.5
	Gasoline for vehicles and boats (6,000 gallons X $1.33/gallon)		$8.0
	Automotive equipment and parts		$2.3
	Helicopter- Jet Ranger 6 hours X $500		$3.0
	Fixed wing aircraft charter (Beaver- 25 hrs X $350, 185- 10 hrs X $200, 206- 25 hrs X $250)		$17.0
	Contractual Total	$46.1	$30.8

Project Number: 95258
Project Title: Sockeye Salmon Overescapement
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Intrm	Photographic supplies - camera parts and film	$1.0	$0.0
Intrm	Stationery ($1.0) and duplicating supplies - xerox toner-supplies ($2.0)	$3.0	$0.0
Intrm	Raingear, hip boots and gloves for 12 people @ $250	$3.0	$0.0
Intrm	Scientific supplies (3 nets for fish and zooplankton sampling $3.0), water meter ($1.5)	$4.5	$0.0
Rept	Office supplies-Paper ($1.0), Xerox supplies and computer printer supplies ($1.5)	$2.5	$0.0
Rept	Laboratory glassware ($1.0), chemical reagents ($7.5)	$8.5	$0.0
	Food (500 man days @ $20/day)		$10.0
	Flotation coats for 8 people @ $250		$2.0
	First-Aid/safety supplies-Life raft repack ($1.0), 2 Survival suits @ $0.5, 4 first aid kits @ $125		$2.5
	Helicopter fuel 750 gallons @ $2.00/gallon		$1.5
	Structural supplies- lumber ($2.0), aluminum ($1.0), floats ($6.0), misc. hardware ($1.0)		$10.0
	Tools-welding ($0.5), metal cutters ($0.5), drills , bits , hammers, and saws ($1.0)		$2.0
	Outboard parts- lower units 2 @ $1.5, 4 props @ $0.5, misc. outboard parts ($1.1)		$6.1
	Marine supplies- anchors ($2.0), buoys ($1.0), strobes ($0.5), line and chain ($1.0), conducting cable ($2.5)		$7.0
	Commodities Total	$22.5	$41.1
Equipment:			
Intrm	Rotator/control box and cables for aiming an acoustic transducer.	$10.0	$0.0
Intrm	Biosonics acoustics equipment for fixed aspect and towed body sonar work	$18.0	$0.0
	(equipment includes transducer, computer linkups, computer and associated hardwired components and software		
	1 Generator (1500 watt portable gas powered)	$0.0	$1.0
	1 Portable cellular phone	$0.0	$1.0
	2 75 hp Evinrude/Johnson to replace existing old units	$0.0	$10.0
	Equipment Total	$28.0	$12.0

Project Number: 95258
Project Title: Sockeye Salmon Overescapement
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will restore the natural productivity of Coghill Lake and the resident sockeye salmon population through lake fertilization. The Coghill Lake sockeye salmon stock historically supported important sport and commercial fisheries in western PWS. Salmon returns have declined from a historical average of 250,000 to approximately 25,000 in recent years. The project will achieve the following objectives: 1) apply liquid fertilizer to Coghill Lake between June and September, 2) determine the response of lake nutrient levels, and primary and secondary production to lake fertilization, 3) determine the response of sockeye salmon feeding habits, growth, and overwinter survival to lake fertilization, and 4) estimate the effect of lake fertilization to lake carrying capacity and smolt to adult survival.

Budget Category:	1994 Project No. 94259 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$126.5	$65.6	$61.5	$127.1	$121.1	
Travel	$2.0	$1.6	$0.9	$2.5	$2.5	
Contractual	$154.0	$6.3	$151.0	$157.3	$157.1	
Commodities	$11.8	$2.8	$13.2	$16.0	$16.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$294.3	$76.3	$226.6	$302.9	$296.7	
General Administration	$29.7	$10.3	$19.8	$30.1	$29.2	
Project Total	$324.0	$86.6	$246.4	$333.0	$325.9	
Full-time Equivalents (FTE)	1.6	1.2	1.4	2.6	0.4	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95259
Project Title: Restoration of Coghill Lake Sockeye Salmon Stocks
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Project Description: This project will restore the natural productivity of Coghill Lake and the resident sockeye salmon population through lake fertilization. The Coghill Lake sockeye salmon stock historically supported important sport and commercial fisheries in western PWS. Salmon returns have declined from a historical average of 250,000 to approximately 25,000 in recent years. The project will achieve the following objectives: 1) apply liquid fertilizer to Coghill Lake between June and September, 2) determine the response of lake nutrient levels, and primary and secondary production to lake fertilization, 3) determine the response of sockeye salmon feeding habits, growth, and overwinter survival to lake fertilization, and 4) estimate the effect of lake fertilization to lake carrying capacity and smolt to adult survival

Budget Category:	1994 Project No. 94259 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	Comment 95 Interim	Comment 96 Field	Comment 95 Report
Personnel	$114.9	$65.6	$49.8	$115.4	$109.4	$65.6	$0.0	$43.8	$65.6
Travel	$2.0	$1.6	$0.9	$2.5	$2.5	$1.6	$0.0	$0.9	$1.6
Contractual	$42.6	$6.3	$39.6	$45.9	$45.7	$0.3	$6.0	$45.4	$0.3
Commodities	$10.1	$2.8	$11.5	$14.3	$14.3	$1.4	$1.4	$12.9	$1.4
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$169.6	$76.3	$101.8	$178.1	$171.9	$68.9	$7.4	$103.0	$68.9
General Administration	$20.2	$10.3	$10.2	$20.5	$19.6	$9.9	$0.4	$9.7	$9.9
Project Total	$189.8	$86.6	$112.0	$198.6	$191.5	$78.8	$7.8	$112.7	$78.8
Full-time Equivalents (FTE)	1.2	1.2	1.0	2.2					

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept 1 Fishery Biologist III	0.5	$2.9	0.0	$0.0
1 Fishery Biologist I	2.5	$11.0	3.0	$13.2
1 Fishery Biologist I	2.0	$8.6	0.0	$0.0
1 Limnologist I	1.0	$6.1	0.0	$0.0
1 Biometrician II	3.0	$17.1	0.0	$0.0
2 Fishery Technician III	4.5	$15.7	1.5	$5.2
2 Fishery Technician II	0.0	$0.0	7.0	$25.4
1 Program Manager	0.8	$4.2	1.0	$6.0
Personnel Total	14.3	$65.6	12.5	$49.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95259
Project Title: Restoration of Coghill Lake Sockeye Salmon Stocks
Sub-Project: Limnology/Fisheries Investigation
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	2 RT Cordova/Anchorage @$0.25 for winter meetings + 7 days per diem	$1.6	$0.0
	1 RT Cordova/Soldotna @ $0.4 + 3 days per diem	$0.0	$0.9
	Travel Total	$1.6	$0.9
Contractual:			
Intrm	Air charter 2 RT Cordova/Coghill Lake for limnology and hydroacoustic sampling	$2.0	$0.0
	Hydroacoustic survey contract	$3.8	$0.0
	Air charter 13 RT Cordova/Coghill Lake for limnology, hydroacoustic sampling and field camp support	$0.0	$13.0
	4 Quantitative hydroacoustic surveys @ $3.8	$0.0	$15.0
	Water sample processing contract (12samples/period x 8 periods @ $120/sample	$0.0	$11.6
	4 camera ready copies and 32 bound copies of the final report	$0.5	$0.0
	Contractual Total	$6.3	$39.6

Project Number: 95259
Project Title: Restoration of Coghill Lake Sockeye Salmon Stocks
Sub-Project: Limnology/Fisheries Investigation
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

Commodities:		Reprt/Intrm	Remaining
Intrm	Food for field camp (4 people x 6 days x $20/day)	$0.5	$0.0
	Outboard fuel 100 gallons x $1.50/gallon, oil 4gallons x $15/gallon, and stove oil (20 gallons)	$0.3	$0.0
	Batteries	$0.2	$0.5
	Scientific supplies (formaldehyde (4x4L), sample bottles, micopore filters, rite-in-rain paper, lithium batteries)	$0.8	$2.3
	Office supplies (paper, pens, printer toner, staples, etc.)	$0.4	$1.2
	Building snow removal @ $300/month	$0.6	$1.2
	Food for field camp (2 people x 108 days x $20/day)	$0.0	$4.4
	Outboard fuel 500 gallons x $1.50/gallon, oil 15gallons x $15/gallon, and stove oil (200 gallons)	$0.0	$1.9
	Commodities Total	$2.8	$11.5
Equipment:			
Rept		$0.0	$0.0
Intrm			
	Equipment Total	$0.0	$0.0

Project Number: 95259
Project Title: Restoration of Coghill Lake Sockeye Salmon Stocks
Sub-Project: Limnology/Fisheries Investigation
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Project Description: This project will restore the natural productivity of Coghill Lake and the resident sockeye salmon population through lake fertilization. The Coghill Lake sockeye salmon stock historically supported important sport and commercial fisheries in western PWS. Salmon returns have declined from a historical average of 250,000 to approximately 25,000 in recent years. The project will achieve the following objectives: 1) apply liquid fertilizer to Coghill Lake between June and September, 2) determine the response of lake nutrient levels, and primary and secondary production to lake fertilization, 3) determine the response of sockeye salmon feeding habits, growth, and overwinter survival to lake fertilization, and 4) estimate the effect of lake fertilization to lake carrying capacity and smolt to adult survival

Budget Category:	1994 Project No. 94259 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$11.6	$0.0	$11.7	$11.7	$11.7	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$111.4	$0.0	$111.4	$111.4	$111.4	
Commodities	$1.7	$0.0	$1.7	$1.7	$1.7	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$124.7	$0.0	$124.8	$124.8	$124.8	
General Administration	$9.5	$0.0	$9.6	$9.6	$9.6	
Project Total	$134.2	$0.0	$134.4	$134.4	$134.4	
Full-time Equivalents (FTE)	0.4	0.0	0.4	0.4	0.4	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Staff Biologist GS 11/3	0.0	$0.0	1.3	$4.5
Fisheries Biologist GS 9/1	0.0	$0.0	1.3	$3.5
Fisheries Technician GS 5/1	0.0	$0.0	1.3	$2.3
Program Manager	0.0	$0.0	0.3	$1.4
Personnel Total	0.0	$0.0	4.2	$11.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95259
Project Title: Restoration of Coghill Lake Sockeye Salmon Stocks
Sub-Project: Coghill Lake Fertilization
Agency: Dept. of Agriculture, Forest Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Rept	$0.0	$0.0
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
Contract for fertilizer (based on Fish and Game projections of fertilizer needs)		$106.0
Aircraft chrter to transport and apply fertilizer to Coghill Lake (bid price)		$5.4
Contractual Total	$0.0	$111.4

06/01/94

1995

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Project Number: 95259
Project Title: Restoration of Coghill Lake Sockeye Salmon Stocks
Sub-Project: Coghill Lake Fertilization
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Field supplies		$0.7
Sampling gear		$1.0
Commodities Total	$0.0	$1.7
Equipment:	$0.0	$0.0
Equipment Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95259
Project Title: Restoration of Coghill Lake Sockeye Salmon Stocks
Sub-Project: Coghill Lake Fertilization
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: In 1994 this project surveyed and sampled six National Park sites in the spill area, treated approximately ten subsistence and recreation beaches that still had surface oiling, and identified some beaches where natural recovery is proceeding at a slow rate. Funding is requested to complete data and hydrocarbon sample analysis and write the final reports for 1994 field work. Funding is also requested for RFP's to remove oil from the subsistence and recreation beaches that are showing slow recovery rates. The intent is to develop a pilot project that would both remove the oil from a few beaches and gain experience with new technology that could be applied to other oiled beaches with slow recovery rates. The pilot project would have monitoring costs associated with it that would not be necessary in subsequent years if applied to other beaches.

Budget Category:	1994 Project No. 94266 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$118.1	$63.1	$90.5	$153.6	$47.2	
Travel	$17.1	$5.1	$9.0	$14.1	$4.0	
Contractual	$213.6	$16.3	$1,150.1	$1,166.4	$8.0	
Commodities	$12.0	$2.9	$5.1	$8.0	$2.0	
Equipment	$8.9	$0.0	$9.5	$9.5	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$369.7	$87.4	$1,264.2	$1,351.6	$61.2	
General Administration	$32.7	$10.5	$49.0	$59.5	$7.6	
Project Total	$402.4	$97.9	$1,313.2	$1,411.1	$68.8	
Full-time Equivalents (FTE)	2.0	1.0	1.3	2.3	0.6	
	Dollar amounts are shown in thousands of dollars.					

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

NEPA Cost:	$5.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95266
Project Title: Shoreline Restoration
Agency: AK Dept. of Environmental Conservation

FORM 2A PROJECT DETAIL

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

Project Description: In 1994 this project surveyed and sampled six National Park sites in the spill area, treated approximately ten subsistence and recreation beaches that still had surface oiling, and identified some beaches where natural recovery is proceeding at a slow rate. Funding is requested to complete data and hydrocarbon sample analysis and write the final reports for 1994 field work. Funding is also requested for RFP's to remove oil from the subsistence and recreation beaches that are showing slow recovery rates. The intent is to develop a pilot project that would both remove the oil from a few beaches and gain experience with new technology that could be applied to other oiled beaches with slow recovery rates. The pilot project would have monitoring costs associated with it that would not be necessary in subsequent years if applied to other beaches.

Budget Category:	1994 Project No. 94266 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$91.2	$28.8	$83.4	$112.2	$40.0	
Travel	$13.2	$3.3	$9.0	$12.3	$4.0	
Contractual	$188.6	$1.7	$1,150.1	$1,151.8	$8.0	
Commodities	$8.0	$0.7	$5.1	$5.8	$2.0	
Equipment	$8.9	$0.0	$9.5	$9.5	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$309.9	$34.5	$1,257.1	$1,291.6	$54.0	
General Administration	$26.9	$4.4	$47.9	$52.3	$6.6	
Project Total	$336.8	$38.9	$1,305.0	$1,343.9	$60.6	
Full-time Equivalents (FTE)	1.5	0.4	1.2	1.5	0.5	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Restoration Specialist (R23)	3.5	$24.1	5.0	$34.4
	Restoration Specialist (R21)	0.0	$0.0	3.0	$20.6
	Restoration Specialist (R18)	1.0	$4.7	6.0	$28.4
	Personnel Total	4.5	$28.8	14.0	$83.4

NEPA Cost: $5.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	Juneau to Anchorage ($450/trip + 2.5 days per diem @ $150/day x 4 trips)	$3.3	$0.0
	Juneau to Anchorage ($450/trip + 3 days per diem @ $150/day x 10 trips)	$0.0	$9.0
	Travel Total	$3.3	$9.0
Contractual:			
Rept	Long distance phone and fax	$0.4	$5.0
	Mail and courier	$0.4	$1.6
	Copying and printing	$0.3	$2.0
	Printing of 1994 Final Report	$0.4	$0.0
	Freight and cartage	$0.2	$3.0
	Plane/helicopter charter to restoration sites and nearby communities	$0.0	$25.0
	Risk management	$0.0	$10.0
	Film processing	$0.0	$0.5
	Newspaper adds	$0.0	$3.0
	RFP's for restoration of up to three different oiled beaches using different restoration methods	$0.0	$900.0
	RSA's and/or contracts to monitor the ecological results of treatment. The actual monitoring program will be developed following selection of treatment methods. Some of the funds will need to be rolled over into FFY 96.	$0.0	$200.0
	Contractual Total	$1.7	$1,150.1

Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Office supplies	$0.3	$1.0
	Computer supplies	$0.4	$2.0
	Film/photographic supplies/video tape	$0.0	$0.8
	Sampling equipment	$0.0	$0.8
	Survival and safety equipment < $500	$0.0	$0.5
	Commodities Total	$0.7	$5.1
Equipment:			
	Fax machine	$0.0	$3.5
	Portable computer	$0.0	$6.0
	Equipment Total	$0.0	$9.5

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Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project:
Agency: AK Dept. of Environmental Conservation

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: In 1994 this project surveyed and sampled six National Park sites in the spill area, treated approximately ten subsistence and recreation beaches that still had surface oiling, and identified some beaches where natural recovery is proceeding at a slow rate. Funding is requested to complete data and hydrocarbon sample analysis and write the final reports for 1994 field work. Funding is also requested for RFP's to remove oil from the subsistence and recreation beaches that are showing slow recovery rates. The intent is to develop a pilot project that would both remove the oil from a few beaches and gain experience with new technology that could be applied to other oiled beaches with slow recovery rates. The pilot project would have monitoring costs associated with it that would not be necessary in subsequent years if applied to other beaches.

Budget Category:	1994 Project No. 94266 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$26.9	$8.7	$0.0	$8.7	$0.0	This component of 95266 focuses on repeated monitoring of established study sites. These sites will need to be resampled in two to three years at a cost of about $85K.
Travel	$3.9	$1.8	$0.0	$1.8	$0.0	
Contractual	$25.0	$14.6	$0.0	$14.6	$0.0	
Commodities	$4.0	$0.2	$0.0	$0.2	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$59.8	$25.3	$0.0	$25.3	$0.0	
General Administration	$5.8	$2.3	$0.0	$2.3	$0.0	
Project Total	$65.6	$27.6	$0.0	$27.6	$0.0	
Full-time Equivalents (FTE)	0.5	0.2	0.0	0.2	0.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Project Manager	1.0	$6.2	0.0	$0.0
	Technician	1.0	$2.5	0.0	$0.0
	Personnel Total	2.0	$8.7	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project:
Agency: Dept. of Interior, National Biological Survey

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Rept Trip to professional meeting ($900 air fare + 6 days per diem @ $150/day)	$1.8	$0.0
Travel Total	$1.8	$0.0
Contractual:		
Rept Contract for geomorphology services with the University of Alaska Fairbanks	$14.6	$0.0
Contractual Total	$14.6	$0.0

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1995

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Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project:
Agency: Dept. of Interior, National Biological Survey

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Rept Office supplies	$0.2	$0.0
Commodities Total	$0.2	$0.0
Equipment:		
Equipment Total	$0.0	$0.0

06/01/94

1995

Printed: 9/12/94 12:34 PM

Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project:
Agency: Dept. of Interior, National Biological Survey

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: In 1994 this project surveyed and sampled six National Park sites in the spill area, treated approximately ten subsistence and recreation beaches that still had surface oiling, and identified some beaches where natural recovery is proceeding at a slow rate. Funding is requested to complete data and hydrocarbon sample analysis and write the final reports for 1994 field work. Funding is also requested for RFP's to remove oil from the subsistence and recreation beaches that are showing slow recovery rates. The intent is to develop a pilot project that would both remove the oil from a few beaches and gain experience with new technology that could be applied to other oiled beaches with slow recovery rates. The pilot project would have monitoring costs associated with it that would not be necessary in subsequent years if applied to other beaches.

Budget Category:	1994 Project No. 94266 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$25.6	$7.1	$32.7	$7.2	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$2.0	$0.0	$2.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$27.6	$7.1	$34.7	$7.2	
General Administration	$0.0	$3.8	$1.1	$4.9	$1.1	
Project Total	$0.0	$31.4	$8.2	$39.6	$8.3	
Full-time Equivalents (FTE)	0.0	0.4	0.1	0.5	0.1	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Senior Chemist (GS-13)	1.5	$10.7	1.0	$7.1
	Chemist (GS-11)	3.0	$14.9	0.0	$0.0
	Personnel Total	4.5	$25.6	1.0	$7.1

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

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Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project: Hydrocarbon Analysis & Data Interpretation
Agency: National Oceanic & Atmospheric Admin.

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

06/01/94

1995

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Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project: Hydrocarbon Analysis & Data Interpretation
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Rept Chemistry laboratory supplies: glassware, solvents, chemicals, etc.	$2.0	$0.0
Commodities Total	$2.0	$0.0
Equipment:		
Equipment Total	$0.0	$0.0

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1995

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Project Number: 95266
Project Title: Shoreline Restoration
Sub-Project: Hydrocarbon Analysis & Data Interpretation
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: This project will restore damaged subsistence resources resulting from the *Exxon Valdez* oil spill in 1989. Approximately 50,000 chinook salmon smolts from Wally Noerenberg Hatchery will be released near Chenega village on Evans Island, Prince William Sound. This release will result in a total return of approximately 2,000 adult chinook salmon to residents of Chenega, and to local sport and commercial fishermen.

Budget Category:	1994 Project No. 94272 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$3.4	$0.0	$6.0	$6.0	$6.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$50.0	$0.0	$37.7	$37.7	$37.7	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$53.4	$0.0	$43.7	$43.7	$43.7	
General Administration	$4.0	$0.0	$3.5	$3.5	$3.5	
Project Total	$57.4	$0.0	$47.2	$47.2	$47.2	
Full-time Equivalents (FTE)		0.0	0.1	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rem Program Manager	0.0	$0.0	1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95272
Project Title: Chenega Chinook Release Program
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Rept		
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
Rept		
Intrm		
Rem Contract between ADF&G and the Prince William Sound Aquaculture Corporation to produce, transfer, rear, feed and release 50,000 chinook smolts to Crab Bay, near Chenega village.		
Broodstock harvest/eggtake/incubation	$0.0	$21.0
On-site rearing and tagging at hatchery*	$0.0	$4.7
Barge transportation of smolts to Crab Bay/remote rearing/release	$0.0	$10.2
Administration	$0.0	$1.8
*NOTE: Remote rearing and release includes contract to pay local residents of Chenega for feeding and careful monitoring of smolts during rearing phase.		
Contractual Total	$0.0	$37.7

Project Number: 95272
Project Title: Chenega Chinook Release Program
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

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

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Project Number: 95272
Project Title: Chenega Chinook Release Program
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The goal of the project is to restore the subsistence uses of fish and wildlife damaged by the Exxon Valdez oil spill. It is expected that by responding to the specific oil spill related concerns of subsistence users, and reporting accurate health information back to the affected communities in clear, understandable language and in one on one discussions, the confidence of subsistence users in the resource can be restored. Past efforts in this direction have been partially successful.

Budget Category:	1994 Project No. 94279 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$190.3	$49.3	$58.5	$107.8	$32.4	
Travel	$25.0	$16.6	$7.9	$24.5	$10.0	
Contractual	$93.1	$4.8	$50.0	$54.8	$3.8	
Commodities	$35.7	$2.7	$0.8	$3.5	$0.2	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$344.1	$73.4	$117.2	$190.6	$46.4	
General Administration	$35.1	$7.7	$12.3	$20.0	$5.1	
Project Total	$379.2	$81.1	$129.5	$210.6	$51.5	
Full-time Equivalents (FTE)	0.0	0.9	1.0	1.9	0.0	
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95279

Project Title: Subsistence Foods Testing Project

Agency: AK. Dept of Fish & Game

FORM 2A PROJECT DETAIL

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

Project Description: The goal of the project is to restore the subsistence uses of fish and wildlife damaged by the Exxon Valdez oil spill. It is expected that by responding to the specific oil spill related concerns of subsistence users, and reporting accurate health information back to the affected communities in clear, understandable language and in one on one discussions, the confidence of subsistence users in the resource can be restored. Past efforts in this direction have been partially successful.

Budget Category:	1994 Project No. 94279 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$95.3	$39.3	$58.5	$97.8	$32.4
Travel	$25.0	$16.6	$7.9	$24.5	$10.0
Contractual	$90.1	$4.8	$50.0	$54.8	$3.8
Commodities	$2.0	$1.7	$0.8	$2.5	$0.2
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$212.4	$62.4	$117.2	$179.6	$46.4
General Administration	$20.6	$6.2	$12.3	$18.5	$5.1
Project Total	$233.0	$68.6	$129.5	$198.1	$51.5
Full-time Equivalents (FTE)		0.7	1.0	1.7	
Dollar amounts are shown in thousands of dollars.					

Comment		
94 Report	95 Interim	95 Report
$32.4	$6.9	$32.4
$11.6	$5.0	$10.0
$3.8	$1.0	$3.8
$1.5	$0.0	$0.2
$0.0	$0.2	$0.0
$0.0	$0.0	$0.0
$49.3	$13.1	$46.4
$5.1	$1.1	$5.1
$54.4	$14.2	$51.5

The figures quoted in the FFY 96 column include the report writing budget only. It is too soon to know whether additional work will be needed in the 1996 field season

The interim request is for rollover authority for funds that were approved by the Trustee Council in FFY94 and will be used in the fall of FFY95.

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	3 Subsistence Resource Specialist II	6.0	$28.2	0.0	$0.0
Rem	5 Subsistence Resource Specialist II	0.0	$0.0	10.0	$47.0
	1 Research Analyst	0.0	$0.0	1.0	$5.5
	1 Program Manager	0.8	$4.2	1.0	$6.0
Intrm	1 Fish & Wildlife Technician III	1.0	$3.6	0.0	$0.0
	1 Subsistence Resource Specialist II	0.5	$2.3	0.0	$0.0
	1 Student Intern	0.5	$1.0	0.0	$0.0
	Personnel Total	8.8	$39.3	12.0	$58.5

Project Number: 95279
Project Title: Subsistence Foods Testing Project
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Travel:				Reprt/Intrm	Remaining
Int 2 RT Kodiak/Anc. @ $0.2 + 8 days per diem $100	$1.2	Int-2 Charters Anch./Chenega + 20 days per diem @ $100	$3.8	$5.0	$0.0
4 RT Anch. - Kodiak City @ $0.19 + 4 days per diem	$1.4	2 RT Anch. - Kodiak City @ $0.19 + 4 days per diem	$1.0	$1.4	$1.0
4 RT Kodiak City to Akhiok @$0.15 + 2 days per diem	$0.9	2 RT Kodiak City to Akhiok @$0.15 + 1 day per diem	$0.5	$0.9	$0.5
4 RT Kodiak City - Karluk @ $0.11 + 2 days per diem	$0.7	2 RT Kodiak City - Karluk @ $0.11 + 1 day per diem	$0.4	$0.7	$0.4
4 RT Kodiak City - Larsen Bay @ $0.08 + 2 days per diem	$0.6	1 RT Kodiak City - Larsen Bay @ $0.08 + 1 day per diem	$0.2	$0.6	$0.2
4 RT Kodiak City - Old Harbor @ $0.1 + 2 days per diem	$0.7	1 RT Kodiak City - Old Harbor @ $0.1 + 1 day per diem	$0.3	$0.7	$0.3
4 RT Kodiak City - Ouzinkie $0.06 + 2 day per diem	$0.5	1 RT Kodiak City - Ouzinkie $0.06 + 1 day per diem	$0.2	$0.5	$0.2
4 RT Kodiak City - Port Lions @$0.1 + 2 days per diem	$0.7	1 RT Kodiak City - Port Lions @ $0.1 + 1 days per diem	$0.3	$0.7	$0.3
2 RT Anchorage to Homer @ $0.1 + 2 days per diem	$0.5	2 RT Anchorage to Homer @ $0.1 + 2 days per diem	$0.5	$0.5	$0.5
4 RT Anch. - Pt. Graham/Nanwalek@ $0.1 + 2 days per diem	$0.7	2 RT Anch. - Pt. Graham/Nanwalek@ $0.1 + 1 days per diem	$0.4	$0.7	$0.4
2 RT Achorage _ Chenega Bay @ $0.9 + 2 days per diem	$2.1	2 RT Achorage _ Chenega Bay @ $0.9 + 1 days per diem	$2.0	$2.1	$2.0
2 RT Anchorage - Tatitlek @$0.55 + 2 day per diem	$1.4	2 RT Anchorage - Tatitlek @$0.55 + 2 day per diem	$1.4	$1.4	$1.4
2 RT Anchorage - Valdez @ $0.16 + 2 days per diem	$0.6	1 RT Anchorage - Valdez @ $0.16 + 2 days per diem	$0.5	$0.6	$0.5
2 RT Anchorage - Cordova @ $0.2 + 2 days per diem	$0.7	1 RT Anchorage - Cordova @ $0.2 + 2 days per diem	$0.5	$0.7	$0.5
Report Travel		Remaining Travel	**Total Travel**	$16.6	$7.9

Contractual:			
Production and distribution of Subsistence Restoration Newsletter, including layout, printing, folding, labelling, and mailing		$3.8	$10.0
Training of subsistence users in sample collection and assembly of sampling kits, including purchase of sampling equipment and chemicals			$40.0
Intrm Boat charter 1 day @ $800/day		$0.8	
Shipping of samples		$0.2	
	Contractual Total	$4.8	$50.0

Project Number: 95279
Project Title: Subsistence Foods Testing Project
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3B SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Paper, office supplies	$0.3	$0.8
	Wordperfect Software	$0.5	
	Pagemaker software for newsletter layout	$0.7	
Intrm	Sampling supplies, film, paper, pens, etc.	$0.2	
	Commodities Total	$1.7	$0.8
Equipment:			
Rept			
	Equipment Total	$0.0	$0.0

Project Number: 95279
Project Title: Subsistence Foods Testing Project
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The goal of the project is to restore the subsistence uses of fish and wildlife damaged by the Exxon Valdez oil spill. It is expected that by responding to the specific oil spill related concerns of subsistence users, and reporting accurate health information back to the affected communities in clear, understandable language and in one on one discussions, the confidence of subsistence users in the resource can be restored. Past efforts in this direction have been partially successful.

Budget Category:	1994 Project No. 94279 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$95.0	$10.0	$0.0	$10.0	$0.0	This is a closeout budget for the hydro-
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	carbon testing portion of this project.
Contractual	$3.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$33.7	$1.0	$0.0	$1.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$131.7	$11.0	$0.0	$11.0	$0.0	
General Administration	$14.5	$1.5	$0.0	$1.5	$0.0	
Project Total	$146.2	$12.5	$0.0	$12.5	$0.0	
Full-time Equivalents (FTE)		0.2	0.0	0.2		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	GS-13	1.0	$6.8		
	GS-7	1.0	$3.2		
	Personnel Total	2.0	$10.0	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

06/01/94

1995

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Project Number: 95279
Project Title: Subsistence Foods Testing Project
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3A SUB-PROJECT DETAIL

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

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

06/01/94

1995

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Project Number: 95279
Project Title: Subsistence Foods Testing Project
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept	Computer software (graphics, tables)	$0.6	$0.0
	Supplies and printing	$0.4	$0.0
	Commodities Total	$1.0	$0.0
Equipment:			
Rept		$0.0	$0.0
	Equipment Total	$0.0	$0.0

06/01/94

1995

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Project Number: 95279
Project Title: Subsistence Foods Testing Project
Sub-Project:
Agency: National Oceanic & Atmospheric Admin.

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Subtidal Sediment Recovery Monitoring - the purpose of this project was to determine the amount of oil remaining in the subtidal environment at the locations formerly contaminated by oil in Gulf of Alaska sediments there and to compare the amount of oil remaining in sediments at those locations with that at comparable locations in Prince William Sound.

Budget Category:	1994 Project No. 94285 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$175.8	$97.9	$0.0	$97.9	
Travel	$11.6	$3.0	$0.0	$3.0	
Contractual	$60.0	$0.0	$0.0	$0.0	
Commodities	$33.0	$5.4	$0.0	$5.4	
Equipment	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	
Subtotal	$280.4	$106.3	$0.0	$106.3	$0.0
General Administration	$30.6	$14.7	$0.0	$14.7	$0.0
Project Total	$311.0	$121.0	$0.0	$121.0	$0.0
Full-time Equivalents (FTE)	3.4	1.7	0.0	1.7	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project Leader GS - 13	4.0	$27.9		
Chemist GS - 9	7.0	$29.5		
Fisheries Biologist GS - 9	7.0	$29.3		
Sr. Chemist GS - 13	0.8	$6.2		
Program Manager GS - 12	1.0	$5.0		
Personnel Total	19.8	$97.9	0.0	$0.0

Comment

Note: This is a closeout project.

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95285-CLO
Project Title: Subtidal Sediment Recovery Monitoring
Sub-Project: Sediment Hydrocarbons
Agency: National Oceanic & Atmospheric Admin

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	2 trips to Anchorage by P.I. and Program Manager for meeting (Airfare $450, perdiem $225/day)	$3.0	
	Travel Total	$3.0	$0.0
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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1995

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Project Number: 95285-CLO
Project Title: Subtidal Sediment Recovery Monitoring
Sub-Project: Sediment Hydrocarbons
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Chemical lab supplies	$2.0	
	Solvents for sample processing	$2.6	
	Office/manuscript supplies	$0.8	
	Commodities Total	$5.4	$0.0
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95285-CLO
Project Title: Subtidal Sediment Recovery Monitoring
Sub-Project: Sediment Hydrocarbons
Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Hydrocarbon Data Analysis , Interpretation and Database Maintenance for Restoration -This project will provide: (a) continued use and access of 1989-94 NRDA and Restoration hydrocarbon data; (b) expansion of the hydrocarbon database with new hydrocarbon and collection information for current Restoration studies collecting samples, requiring analysis and data archival; (c) interpretation of past and current hydrocarbon results for PI's managers, and the public (d) continued quality control of sample storage, and hydrocarbon analyses, and data archival.

Budget Category:	1994 Project No. 94290 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$104.5	$76.4	$54.8	$131.2		
Travel	$4.0	$2.0	$4.0	$6.0		
Contractual	$0.0	$0.0	$0.0	$0.0		
Commodities	$3.5	$2.0	$4.5	$6.5		
Equipment	$2.5	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$114.5	$80.4	$63.3	$143.7	$0.0	
General Administration	$15.7	$11.5	$8.2	$19.7	$0.0	
Project Total	$130.2	$91.9	$71.5	$163.4	$0.0	
Full-time Equivalents (FTE)	1.4	1.0	0.7	1.7		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project Leader GS - 11	7.0	$43.8	5.0	$31.3
Sr. Chemist GS -13	3.5	$26.0	2.8	$21.0
Computer Tech GS - 9	1.0	$4.1	0.0	$0.0
Program Manager GS - 12	0.5	$2.5	0.5	$2.5
Personnel Total	12.0	$76.4	8.3	$54.8

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95290

Project Title: Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the Exxon Valdez Oil Spill

Agency: National Oceanic & Atmospheric Admin

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	5 trips to Anchorage for meetings for P.I. and Senior Chemist	$2.0	$4.0
Rem	Airfare @ $450, per diem @ $225; car rental @ $180, miscellaneous @ $50		
	Travel Total	$2.0	$4.0
Contractual:			
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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1995

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Project Number: 95290
Project Title: Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the Exxon Valdez Oil Spill
Agency: National Ocea & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Rept		
Computer software upgrades	$0.5	$1.0
Computer hardware/UPS maintenance and repairs	$1.0	$2.2
Office supplies (disks, etc.), mapping supplies	$0.3	$1.0
Freezer maintenance	$0.2	$0.3
Commodities Total	$2.0	$4.5
Equipment:		
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95290

Project Title: Hydrocarbon Data Analysis, Interpretation, and Database Maintenance for Restoration and NRDA Environmental Samples Associated with the Exxon Valdez Oil Spill

Agency: National Oceanic & Atmospheric Admin

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Sea Plan - Assessment of Juvenile Salmon Growth and Mortality in PWS- This project will track the migration of juvenile salmon through PWS, compare growth rates of juvenile salmon among years, evaluate the carrying capacity of PWS for juvenile salmon and other age-0 fishes, and develop techniques for estimating the mortality of juvenile pink salmon within PWS. The carrying capacity of PWS for juvenile fishes will be evaluated through an examination of diet overlap among juvenile fishes and application of bioenergetic models to determine if the growth rate of juvenile salmon was likely limited by low food abundance. This information will be useful for restoration managers facing decisions regarding appropriate fish resource enhancement strategies.

Budget Category:	1994 Project No. 94320-A Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment			
						94 Report	95 Interim	95 Report	96 Field
Personnel	$124.1	$39.5	$130.6	$170.1	$170.1	$39.5	$0.0	$39.5	$130.6
Travel	$0.5	$0.0	$1.2	$1.2	$1.2	$0.0	$0.0	$0.0	$1.2
Contractual	$95.0	$0.0	$49.8	$49.8	$49.8	$0.0	$0.0	$0.0	$49.8
Commodities	$13.2	$3.3	$14.4	$17.7	$17.7	$3.3	$0.0	$3.3	$14.4
Equipment	$4.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$236.8	$42.8	$196.0	$238.8	$238.8	$42.8	$0.0	$42.8	$196.0
General Administration	$26.6	$5.9	$23.1	$29.0	$29.0	$5.9	$0.0	$5.9	$23.1
Project Total	$263.4	$48.7	$219.1	$267.8	$267.8	$48.7	$0.0	$48.7	$219.1
Full-time Equivalents (FTE)	1.9	0.8	2.3	3.1	3.1				

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	
Fishery Biologist III		0.0	$0.0	2.5	$14.3	
Fishery Biologist I		1.5	$6.6	6.0	$36.3	Includes overtime and seapay
3 Fish and Wildlife Technician II		0.0	$0.0	7.0	$39.2	Includes overtime and seapay
Fish and Wildlife Technician III		3.0	$10.5	4.0	$14.0	
Fish and Wildlife Technician III		3.0	$10.5	4.0	$14.0	
Fish and Wildlife Technician III		0.5	$1.8	1.5	$5.3	
Fish and Wildlife Technician II		0.5	$1.5	1.5	$4.6	
Biometrician II		1.5	$8.6	0.5	$2.9	
	Personnel Total	10.0	$39.5	27.0	$130.6	

NEPA Cost:	$0.0
*Oct 1, 1994 - Dec 31, 1994	
**Jan 1, 1995 - Sep 30, 1995	

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Project Number: 95320A
Project Title: Prince William Sound System Investigation
Sub-Project: Salmon Growth
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
Two RT Cordova/Anchorage @ $250 + 5 days per diem @ $140	$0.0	$1.2
Travel Total	$0.0	$1.2
Contractual:		
6 air charter flights @ $300 to transport staff from Cordova to the vessel	$0.0	$1.8
Vessel charter for 60 days @ $800/day to provide logistical support to track juvenile salmon migration	$0.0	$48.0
Contractual Total	$0.0	$49.8

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Project Number: 95320A
Project Title: Prince William Sound System Investigation
Sub-Project: Salmon Growth
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Office supplies (copy paper, toner, diskettes, etc)	$0.5	$1.5
Laboratory supplies (wide mouth plastic bottles, scintillation vials, formaldehyde, etc)	$2.3	$1.5
Field sampling supplies (food, fuel, oil, etc.)	$0.0	$2.0
Utilities (Heating oil, electricity, etc.)	$0.5	$1.5
Charter vessel fuel (approximatley 5300 gallons @ $1.50/gallon)	$0.0	$7.9
Commodities Total	$3.3	$14.4
Equipment:	$0.0	$0.0
Equipment Total	$0.0	$0.0

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1995

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Project Number: 95320A
Project Title: Prince William Sound System Investigation
Sub-Project: Salmon Growth
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Coded Wire Tag Recoveries from Pink Salmon CLOSEOUT - This is a closeout project to write the report on data collected in FFY 94 and to recover and store equipment from the field.

Budget Category:	1994 Project No. 94320 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$167.7	$68.1	$0.0	$68.1	$0.0	Report cost include the cost for recovering and storing equipment.
Travel	$12.6	$2.6	$0.0	$2.6	$0.0	
Contractual	$26.6	$3.2	$0.0	$3.2	$0.0	
Commodities	$14.7	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$221.6	$73.9	$0.0	$73.9	$0.0	
General Administration	$27.0	$10.4	$0.0	$10.4	$0.0	
Project Total	$248.6	$84.3	$0.0	$84.3	$0.0	
Full-time Equivalents (FTE)		1.2	0.0	1.2		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept 2 Fishery Biologist II	4.0	$20.8	0.0	$0.0
2 Fishery Biologist I	1.5	$6.5	0.0	$0.0
Biometrician	3.0	$15.2	0.0	$0.0
Fish & Wildlife Technician III (tag lab)	2.0	$6.8	0.0	$0.0
2 Fish & Wildlife Technician II (tag lab)	2.0	$6.2	0.0	$0.0
Data Analyst	1.2	$6.6	0.0	$0.0
Program Manager	1.0	$6.0	0.0	$0.0
Personnel Total	14.7	$68.1	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320-B
Project Title: Coded Wire Tag Recoveries from Pink Salmon Closeout
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	4 RT Cordova/Anchorage @ $0.2 + 12 days per diem @ $150	$2.6	$0.0
Rept			
Rem			
	Travel Total	$2.6	$0.0
Contractual:			
Rept	Air charters to hatcheries 4 Trips @ $0.5	$2.0	$0.0
Rept	DOT vehicle rental 2 months @ $0.6	$1.2	$0.0
Rem			
	Contractual Total	$3.2	$0.0

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1995

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Project Number: 95320-B
Project Title: Coded Wire Tag Recoveries from Pink Salmon Closeout
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

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

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1995

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Project Number: 95320-B
Project Title: Coded Wire Tag Recoveries from Pink Salmon Closeout
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will develop otolith mass marking as an inseason stock separation tool for salmon in PWS. Fishery managers need precise inseason stock composition data to reduce exploitation rates on damaged wild salmon stocks. Coded wire tags are presently used for this purpose, but otolith marking s expected to provide more accurate information at a lower cost. The project will be conducted cooperatively by the AK Dept. of Fish and Game, PWSAC, and VFDA. A small component of the study will test the feasibility of chemically marking fish otoliths by short-term immersion in a dilute solution of tetracycline during the fry stage. This technology will be used in future years to mark wild salmon outmigrants to determine straying rates when the fish return as adults.

Budget Category:	1994Project No. 94320-C Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment	
						94 Report	95 Interim
Personnel	$19.7	$0.0	$25.7	$25.7	$0.0	$0.0	$0.0
Travel	$0.0	$1.6	$0.0	$1.6	$0.0	$1.6	$0.0
Contractual	$3.5	$0.3	$568.3	$568.6	$0.0	$0.3	$0.0
Commodities	$10.4	$0.0	$10.4	$10.4	$0.0	$0.0	$0.0
Equipment	$8.2	$0.0	$8.2	$8.2	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$41.8	$1.9	$612.6	$614.5	$0.0	$1.9	$0.0
General Administration	$3.2	$0.0	$27.7	$27.7	$0.0	$0.0	$0.0
Project Total	$45.0	$1.9	$640.3	$642.2	$0.0	$1.9	$0.0
Full-time Equivalents (FTE)	0.0	0.0	0.6	0.6	0.0	96 budget not available for this deadline.	
Dollar amounts are shown in thousands of dollars.							

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Fishery Biologist I	0.0	$0.0	1.0	$4.5
Fish and Wildlife Techniciam II	0.0	$0.0	0.2	$1.2
Fish and Wildlife Technician II (otolith lab)	0.0	$0.0	4.5	$14.0
Program Manager			1.0	$6.0
Personnel Total	0.0	$0.0	6.7	$25.7

NEPA Cost:	$0.0

*Oct 1, 1994 - Jan 31, 1995

**Feb 1, 1995 - Sep 30, 1995

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Project Number: 95320-C

Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS

Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
2 RT Cordova/Anchorage + 7 days per diem	$1.6	$0.0
Travel Total	$1.6	$0.0
Contractual:		
PWSAC Contract	$0.0	$413.0
VFDA Contract	$0.0	$151.8
Air charter to hatchery (8 RT @ $250/trip)	$0.0	$2.0
Vessel charter	$0.0	$1.5
4 camera-ready copies & 32 bound copies of final report	$0.3	$0.0
Contractual Total	$0.3	$568.3

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Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
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	Reprt/Intrm	Remaining
Commodities:		
Hatchery supplies - Totes, hoses, bags, buckets, pipefittings, chemicals	$0.0	$5.0
Laboratory supplies	$0.0	$5.0
Fuel	$0.0	$0.4
Commodities Total	$0.0	$10.4
Equipment:		
Microscope attachments	$0.0	$8.2
Equipment Total	$0.0	$8.2

Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will develop otolith mass marking as an inseason stock separation tool for salmon in PWS. Fishery managers need precise inseason stock composition data to reduce exploitation rates on damaged wild salmon stocks. Coded wire tags are presently used for this purpose, but otolith marking s expected to provide more accurate information at a lower cost. The project will be conducted cooperatively by the AK Dept. of Fish and Game, PWSAC, and VFDA. A small component of the study will test the feasibility of chemically marking fish otoliths by short-term immersion in a dilute solution of tetracycline during the fry stage. This technology will be used in future years to mark wild salmon outmigrants to determine straying rates when the fish return as adults.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$105.4	$105.4	$0.0	
Commodities	$0.0	$0.0	$45.2	$45.2	$0.0	
Equipment	$0.0	$0.0	$255.0	$255.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$405.6	$405.6	$0.0	
General Administration	$0.0	$0.0	$7.4	$7.4	$0.0	
Project Total	$0.0	$0.0	$413.0	$413.0	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Feb 1, 1994 - Sep 30, 1994

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Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Sub-Project: Otolith Thermal Marking at PWSAC Hatcheries
Agency: Prince William Sound Aquaculture Corporation

FORM 3A
SUB-PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Engineering contracts		
Bid	$0.0	$13.0
Design	$0.0	$29.5
Construction	$0.0	$24.3
Installation	$0.0	$21.8
Ship equipment from Seattle to hatchery sites	$0.0	$15.6
Procurement services	$0.0	$1.2
Contractual Total	$0.0	$105.4

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Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Sub-Project: Otolith Thermal Marking at PWSAC Hatcheries
Agency: Prince William Sound Aquaculture Corporation

FORM 3B
SUB-PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Camp supplies (food, fuel, etc.)		$1.4
Plumbing materials (pipes, valves, etc.)		$41.1
Retaining wall and fill materials (30 cubic yards rock and 40 cubic yards fill)		$2.7
Commodities Total	$0.0	$45.2
Equipment:		
Skid-mounted module with boilers, recirculating pumps, and heat exchangers (3)	$0.0	$255.0
Equipment Total	$0.0	$255.0

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Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Sub-Project: Otolith Thermal Marking at PWSAC Hatcheries
Agency: Prince William Sound Aquaculture Corporation

FORM 3B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Project Description: This project will develop otolith mass marking as an inseason stock separation tool for salmon in PWS. Fishery managers need precise inseason stock composition data to reduce exploitation rates on damaged wild salmon stocks. Coded wire tags are presently used for this purpose, but otolith marking s expected to provide more accurate information at a lower cost. The project will be conducted cooperatively by the AK Dept. of Fish and Game, PWSAC, and VFDA. A small component of the study will test the feasibility of chemically marking fish otoliths by short-term immersion in a dilute solution of tetracycline during the fry stage. This technology will be used in future years to mark wild salmon outmigrants to determine straying rates when the fish return as adults.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$4.5	$4.5	$0.0	
Commodities	$0.0	$0.0	$26.2	$26.2	$0.0	
Equipment	$0.0	$0.0	$120.8	$120.8	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$151.5	$151.5	$0.0	
General Administration	$0.0	$0.0	$0.3	$0.3	$0.0	
Project Total	$0.0	$0.0	$151.8	$151.8	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0		

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: $0.0

*Oct 1, 1993 - Jan 31, 1994

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Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Sub-Project: Otolith Thermal Marking at Solomon Gulch Hatchery
Agency: Valdez Fisheries Development Association

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CONTRACTUAL
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Ship equipment from Seattle to hatchery	$0.0	$4.5
Contractual Total	$0.0	$4.5

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Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Sub-Project: Otolith Thermal Marking at Solomon Gulch Hatchery
Agency: Valdez Fisheries Development Association

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SUB-PROJECT
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DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Plumbing materials,(pipes, valves, etc.)	$0.0	$17.8
Materials for snow roof over equipment (foundation, framing, sheathing, metal roofing)	$0.0	$8.4
Commodities Total	$0.0	$26.2
Equipment:		
Skid -mounted module with boilers, recirculating pumps, and heat exchanger (1)	$0.0	$96.9
Degassing system (vacuum columns, valves, piping, column supports)	$0.0	$23.9
Equipment Total	$0.0	$120.8

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Project Number: 95320-C
Project Title: Otolith Thermal Mass Marking of Hatchery Pink Salmon In PWS
Sub-Project: Otolith Thermal Marking at Solomon Gulch Hatchery
Agency: Valdez Fisheries Development Association

FORM 3B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Prince William Sound Pink Salmon Genetics- This project will use two molecular genetic approaches to determine stock structure of pink salmon in Prince William Sound. This information will be used to manage commercial harvest to protect wild pink salmon populations affected by EVOS while maintaining a viable commercial fishery for hatchery-released pink salmon.

Budget Category:	1994 Project No. 95320-D Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95Report	96 Field
Personnel	$36.2	$33.5	$16.3	$49.8	$45.0	$33.5	$0.0	$45.0	$0.0
Travel	$3.0	$3.0	$2.0	$5.0	$3.0	$3.0	$0.0	$2.0	$1.0
Contractual	$112.2	$0.0	$140.0	$140.0	$63.8	$0.0	$0.0	$0.0	$63.8
Commodities	$6.5	$15.0	$0.0	$15.0	$10.0	$15.0	$0.0	$10.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$157.9	$51.5	$158.3	$209.8	$121.8	$51.5	$0.0	$57.0	$64.8
General Administration	$13.3	$5.0	$12.2	$17.2	$11.3	$5.0	$0.0	$6.8	$4.5
Project Total	$171.2	$56.5	$170.5	$227.0	$133.1	$56.5	$0.0	$63.8	$69.3
Full-time Equivalents (FTE)	0.7	0.8	0.4	1.2	1.0				

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Fish and Wildlife Technician III	9.0	$29.3	3.0	$9.1
Intrm	Program Manager	0.8	$4.2	1.3	$7.2
Rem					
	Personnel Total	9.8	$33.5	4.3	$16.3

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320-D
Project Title: Prince William Sound Pink Salmon Genetics
Agency: AK Dept. of Fish & Game

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

		Reprt/Intrm	Remaining
Travel:			
Rept	42 RT Anchorage/Juneau @ $425 + 2 day per diem	$1.0	$1.0
	2 RT Out of state to contract winner @ approximately $750 + 10 days per diem	$2.0	$1.0
	Travel Total	$3.0	$2.0
Contractual:			
Rept			
Intrm			
	Allozyme analysis of pink salmon		$140.0
	Contractual Total	$0.0	$140.0

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Project Number: 95320-D
Project Title: Prince William Sound Pink Salmon Genetics
Agency: AK Dept. of Fish & Game

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
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		Reprt/Intrm	Remaining
Commodities:			
Rept	Biochemicals	$10.0	$0.0
	Laboratory supplies (cryovials ($1.0), PCR supplies($3.0), and mis,. plates, film, glassware ($1.0)	$5.0	$0.0
	Commodities Total	$15.0	$0.0
Equipment:			
Rept			
Intrm		$0.0	$0.0
	Equipment Total	$0.0	$0.0

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Project Number: 95320-D
Project Title: Prince William Sound Pink Salmon Genetics
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Assessment of Juvenile Salmon Predation in PWS - This is a multi-year project designed to test two hypotheses regarding mechanisms that may regulate predation on juvenile salmon and herring in PWS. The objectives for the second year are: 1) determine the distribution, abundance, species and size composition of fish predators along the juvenile salmon migratory pathway, 2) estimate the juvenile salmon consumption rate of fish predators in PWS 3) determine the relationship between juvenile salmon predation rate and macrozooplankton abundance, 4) determine the relationship between juvenile salmon predation rate and juvenile salmon abundance, 5) collect samples for 95163, and 6) provide shared sampling platforms for the SEA program.

Budget Category:	1994 Project No. 94320-E Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment			
						94 Report	95 Interim	95 Report	96 Field
Personnel	$228.9	$76.9	$298.0	$374.9	$374.9	$76.9	$0.0	$76.9	$298.0
Travel	$1.7	$0.0	$2.8	$2.8	$2.8	$0.0	$0.0	$0.0	$2.8
Contractual	$438.1	$0.0	$374.4	$374.4	$374.4	$0.0	$0.0	$0.0	$374.4
Commodities	$10.2	$7.8	$89.2	$97.0	$97.0	$7.8	$0.0	$7.8	$89.2
Equipment	$95.6	$17.8	$0.0	$17.8	$1.8	$1.8	$16.0	$1.8	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$774.5	$102.5	$764.4	$866.9	$850.9	$86.5	$16.0	$86.5	$764.4
General Administration	$60.6	$11.5	$64.7	$76.2	$76.2	$11.5	$0.0	$11.5	$64.7
Project Total	$835.1	$114.0	$829.1	$943.1	$927.1	$98.0	$16.0	$98.0	$829.1
Full-time Equivalents (FTE)	3.5	1.6	4.5	6.1	6.2				

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
1 Fishery Biologist III	0.0	$0.0	3.0	$17.2
5 Fishery Biologist I	9.0	$40.0	21.0	$137.7
1 Fish & Wildlife Technician III	1.5	$5.3	2.5	$8.8
3 Fish & Wildlife Technician II	7.5	$23.0	16.5	$69.8
Fish & Wildlife Technician II	0.0	$0.0	3.0	$17.2
Fish & Wildlife Technician II	0.0	$0.0	3.0	$16.5
Fish & Wildlife Technician II	0.0	$0.0	3.0	$16.5
Biometrician II	1.5	$8.6	2.5	$14.3
Personnel Total	19.5	$76.9	54.5	$298.0

The budget for the FB I and F&WT include sea duty and overtime hours aboard a ship

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320E
Project Title: Prince William Sound System Investigation
Sub-Project: Juvenile Salmon and Herring Integration
Agency: AK Dept. of Fish & Game

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	Reprt/Intrm	Remaining
Travel:		
Two RT Cordova/Anchorage @ $250 +5 days per diem @$140.		$1.2
Two RT Soldotna/Cordova @$400 + 5 days per diem @ $160.		$1.6
Travel Total	$0.0	$2.8
Contractual:		
Air charter flights to transport staff from Cordova to the vessels (approximately 28 hours @ $250/hour)		$7.0
Charter for a trawl vessel for mid-water trawl sampling of juvenile salmon predators (75 days @ $2.8/day)		$210.0
Charter of a purse seine vessel for nearshore sampling of juvenile salmon predators (75 days @ $1.2/day)		$90.0
Charter of a purse seine vessel for nearshore sampling of juvenile salmon predators (55 days @ $1.2/day)		$66.0
Repair small-mesh purse seine		$1.4
Contractual Total	$0.0	$374.4

Project Number: 95320E
Project Title: Prince William Sound System Investigation
Sub-Project: Juvenile Salmon and Herring Integration
Agency: AK Dept. of Fish & Game

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

Commodities:	Reprt/Intrm	Remaining
Office supplies (copy paper, toner, diskettes, etc.)	$1.9	$1.8
Laboratory supplies (side mouth plastic bottles, bottle totes formaldehyde, weighing scales, etc.)	$3.5	$6.9
Charter vessel fuel (3 vessels X ave. 70 days X 280 gallons/day X $1.25/gallon)	$0.0	$73.3
Utilities (Heating oil, electricity, etc.)	$2.4	$7.2
Commodities Total	$7.8	$89.2
Equipment:		
Laserjet Printer	$1.8	$0.0
20' aluminum skiff (must be ordered during the interim period to arrive for field season)	$12.0	$0.0
70 hp outboard motor (must be ordered during the interim period to arrive for field season)	$4.0	$0.0
Equipment Total	$17.8	$0.0

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Project Number: 95320E
Project Title: Prince William Sound System Investigation
Sub-Project: Juvenile Salmon and Herring Integration
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: SEA Plan - SEA Plankton Dynamics - Phytoplankton and Nutrients - This is a study of the role of phytoplankton communities and associated nutrient cycles in ecosystem restoration in PWS. Phytoplankton may be a significant forcing function on the dynamics of the food webs of pink salmon and herring. This project will test the "bottom-up" hypothesis of ecosystem restoration, i.e.: that success in the year class of herring and pink salmon is directly related to variations in phytoplankton primary production rather than food web control by zooplankton and fish (the general SEA ecosystem restoration hypothesis).

Budget Category:	1994 Project No. 94320-G Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$3.0	$0.0	$3.0	$149.2	
Travel	$0.0	$0.0	$0.0	$0.0	$21.6	
Contractual	$136.3	$83.5	$146.7	$230.2	$28.9	
Commodities	$0.0	$0.0	$0.0	$0.0	$16.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$20.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$136.3	$86.5	$146.7	$233.2	$236.2	
General Administration	$5.2	$2.0	$4.1	$6.1	$47.2	
Project Total	$141.5	$88.5	$150.8	$239.3	$283.4	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	4.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.5	$3.0	0.0	$0.0
Personnel Total	0.5	$3.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320G
Project Title: Prince William Sound System Investigation
Sub-Project: Phytoplankton/Nutrients
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
RSA with UAF to conduct a phytoplankton project (Interim $70.7, report $12.8)	$83.5	$146.7
Contractual Total	$83.5	$146.7

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Project Number: 95320G
Project Title: Prince William Sound System Investigation
Sub-Project: Phytoplankton/Nutrients
Agency: AK Dept. of Fish & Game

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

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

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Project Number: 95320G
Project Title: Prince William Sound System Investigation
Sub-Project: Phytoplankton/Nutrients
Agency: AK Dept. of Fish & Game

FORM 2A
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Project Description: SEA Plan - SEA Plankton Dynamics - Phytoplankton and Nutrients - This is a study of the role of phytoplankton communities and associated nutrient cycles in ecosystem restoration in PWS. Phytoplankton may be a significant forcing function on the dynamics of the food webs of pink salmon and herring. This project will test the "bottom-up" hypothesis of ecosystem restoration, i.e. that success in the year class of herring and pink salmon is directly related to variations in phytoplankton primary production rather than food web control by zooplankton and fish (the general SEA ecosystem restoration hypothesis).

Budget Category:	1994 Project No. 94320-G Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$90.5	$36.0	$78.8	$114.8	$149.2	$31.0	$5.0	$31.0	$118.2
Travel	$4.5	$2.5	$15.3	$17.8	$21.6	$2.5	$0.0	$2.5	$19.1
Contractual	$5.0	$10.6	$13.6	$24.2	$28.9	$4.9	$5.7	$4.9	$24.0
Commodities	$9.0	$0.3	$12.9	$13.2	$16.0	$0.3	$0.0	$0.3	$15.7
Equipment	$0.0	$19.4	$0.0	$19.4	$1.1	$19.4	$0.0	$0.0	$1.1
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$109.0	$68.8	$120.6	$189.4	$216.8	$58.1	$10.7	$38.7	$178.1
General Administration	$27.3	$14.7	$26.1	$40.8	$43.4	$12.6	$2.1	$7.7	$35.6
Project Total	$136.3	$83.5	$146.7	$230.2	$260.2	$70.7	$12.8	$46.4	$213.7
Full-time Equivalents (FTE)	2.5	0.8	2.5	3.3	4.0				

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	94 Report	95 Interim
Principal investigators	2.0	$20.3	2.0	$17.7	$20.3	$0.0
Technicians	1.8	$9.7	9.6	$43.2	$4.8	$5.0
Students	6.0	$6.0	18.0	$17.9	$6.0	$0.0
Personnel Total	9.8	$36.0	29.6	$78.8		

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320G
Project Title: Prince William Sound System Investigation
Sub-Project: SEA Plankton Dynamics: Phytoplankton/Nutrients
Agency: University of Alaska - Fairbanks

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
	7 RT Fairbanks/PWS @$670/trip + 5 days per diem @ $40	$0.0	$4.9
	2 RT Fairbanks/National Meeting @ $1.6 + 5 days per diem @ $175	$0.0	$4.1
	4 RT Fairbanks/Anchorage @ $400 + 5 days per diem @ $175	$2.5	$2.5
	5 RT Fairbanks/Cordova @ $480 + 7 days per diem @ $40	$0.0	$2.7
	Truck Rental 10 days @ $110/day	$0.0	$1.1
	Travel Total	$2.5	$15.3
Contractual:			
	Publications/Page charges	$0.0	$0.5
Intrm	Buoy Servicing (maintenance and cleaning of sea buoy in November)	$3.2	$0.0
	Communications (long distance phone and fax charges)	$0.3	$0.5
Intrm	Shipping of equipment during the fall and spring	$2.5	$3.0
	Tuition for two graduate students for the fall and spring	$4.6	$4.6
	Argos Service	$0.0	$5.0
	Contractual Total	$10.6	$13.6

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Project Number: 95320G
Project Title: Prince William Sound System Investigation
Sub-Project: SEA Plankton Dynamics: Phytoplankton/Nutrients
Agency: University of Alaska - Fairbanks

FORM 4B
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CONTRACTUAL
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Isotopes	$0.0	$2.0
Chemicals	$0.0	$1.4
Auto-analyzer supplies	$0.0	$1.0
Glassware	$0.0	$1.5
Office Supplies	$0.3	$0.3
Field supplies (rope, gloves, boots,buckets)	$0.0	$0.5
Buoy Materials (Sonic release, cable, line, buoys)	$0.0	$6.2
Commodities Total	$0.3	$12.9
Equipment:		
Autoanalyzer data processor	$3.5	$0.0
Fluorometer Cable	$0.9	$0.0
Thermistor chain	$15.0	$0.0
Equipment Total	$19.4	$0.0

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Project Number: 95320G
Project Title: Prince William Sound System Investigation
Sub-Project: SEA Plankton Dynamics: Phytoplankton/Nutrients
Agency: University of Alaska - Fairbanks

FORM 4B
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CONTRACTUAL
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Project Description: SEA PLAN - The Role of zooplankton in PWS - This project will provide data to test critical hypotheses (lake/river; prey/predator) relating the survival of pink salmon and herring to factors (human caused and natural) constraining their recovery to pre-spill levels.

Budget Category:	1994 Project No. 94320-H Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$3.0	$3.0	$6.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$289.1	$50.6	$187.5	$238.1	$251.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$289.1	$50.6	$190.5	$241.1	$257.0	
General Administration	$11.0	$1.3	$5.0	$6.3	$50.2	
Project Total	$300.1	$51.9	$195.5	$247.4	$307.2	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager			0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320H
Project Title: Prince William Sound System Investigation
Sub-Project: Zooplankton in Ecosystem
Agency: AK Dept. of Fish & Game

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	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
RSA with UAF to conduct the zooplankton study	$50.6	$187.5
Contractual Total	$50.6	$187.5

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Project Number: 95320H
Project Title: Prince William Sound System Investigation
Sub-Project: Zooplankton in Ecosystem
Agency: AK Dept. of Fish & Game

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95320H
Project Title: Prince William Sound System Investigation
Sub-Project: Zooplankton in Ecosystem
Agency: AK Dept. of Fish & Game

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

Project Description: SEA PLAN - The Role of zooplankton in PWS - This project will provide data to test critical hypotheses (lake/river; prey/predator) relating the survival of pink salmon and herring to factors (human caused and natural) constraining their recovery to pre-spill levels.

Budget Category:	1994 Project No. 94320-A Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$159.4	$30.1	$123.6	$153.7	$184.5
Travel	$15.0	$3.0	$11.1	$14.1	$15.0
Contractual	$18.0	$9.1	$15.1	$24.2	$28.1
Commodities	$14.3	$0.0	$4.0	$4.0	$8.4
Equipment	$24.6	$0.0	$0.0	$0.0	$15.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$231.3	$42.2	$153.8	$196.0	$251.0
General Administration	$57.8	$8.4	$33.7	$42.1	$50.2
Project Total	$289.1	$50.6	$187.5	$238.1	$301.2
Full-time Equivalents (FTE)	3.6	0.8	2.7	3.5	

Dollar amounts are shown in thousands of dollars.

Comment	94 Report	95 Interim	95 Report	96 Field
Personnel	$30.1	$0.0	$30.1	$154.4
Travel	$3.0	$0.0	$3.0	$12.0
Contractual	$9.1	$0.0	$9.1	$19.0
Commodities	$0.0	$0.0	$0.0	$8.4
Equipment	$0.0	$0.0	$0.0	$15.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0
Subtotal	$42.2	$0.0	$42.2	$208.8
General Administration	$8.4	$0.0	$8.4	$41.8
Project Total	$50.6	$0.0	$50.6	$250.6

3.0K of remaining general administration is for the University of Alaska - Fairbanks

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
	Principal Investigator	1.0	$10.6	4.0	$42.4
	Assoc. Investigator	1.0	$5.6	3.0	$16.9
	Technicians	2.0	$8.4	10.0	$42.1
2	M.S. Students	6.0	$5.5	12.0	$10.9
	Lab Aide	0.0	$0.0	3.0	$11.3
	Personnel Total	10.0	$30.1	32.0	$123.6

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320H
Project Title: Prince William Sound System Investigation
Sub-Project: Zooplankton in Ecosystem
Agency: University of Alaska - Fairbanks

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

		Reprt/Intrm	Remaining
Travel:			
	2 RT Fairbanks/Anchorage @ $300 + 8 days per diem @ $170	$1.9	$0.0
	12 RT Fairbanks/Cordova @ $350 + 77 days per diem @ $103	$1.1	$11.1
	Travel Total	$3.0	$11.1
Contractual:			
Rpt	Graduate students tuition (2)	$9.1	$0.0
Rem	Communications		
	Photocopy	$0.0	$1.0
	Phone/Fax	$0.0	$2.0
	Typing/Clerical (Recharge center @ $35/hour)	$0.0	$6.1
	Air charter 24 hours @ $250/hr	$0.0	$6.0
	Contractual Total	$9.1	$15.1

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Project Number: 95320H
Project Title: Prince William Sound System Investigation
Sub-Project: Zooplankton in Ecosystem
Agency: University of Alaska - Fairbanks

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

Commodities:	Reprt/Intrm	Remaining
Bottles (1000 - 8 oz. plastic @ $1/bottle, 270 - 16 oz. glass @ $3.67/bottle, 215 - 32 oz glass @ $4.67/bottle)	$0.0	$3.0
Preservative (Formaldehyde, 80 liters @ $12.50 /liter)	$0.0	$1.0
Commodities Total	$0.0	$4.0
Equipment:		
None requested	$0.0	$0.0
Equipment Total	$0.0	$0.0

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Project Number: 95320H
Project Title: Prince William Sound System Investigation
Sub-Project: Zooplankton in Ecosystem
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
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DETAIL

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

Project Description: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers- This project contributes to the ongoing effort in ADF&G project 95064 to determine the reasons for the decline of harbor seal and stellar sea lion populations in PWS. In addition, the project seeks to better describe the trophic interactions and trophic status of marine mammals, birds and their prey species in the PWS ecosystem. The integrating methodology for the range of tasks is the use of stable isotope ratios as natural tracers of carbon and nitrogen transfers through the food webs. Carbon isotope ratios serve as conservative tracers of energy supply between trophic levels (phytoplankton to zooplankton to fishes to top consumers.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$7.2	$7.2	$7.2	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$100.1	$100.1	$100.1	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$107.3	$107.3	$107.3	
General Administration	$0.0	$0.0	$8.1	$8.1	$8.1	
Project Total	$0.0	$0.0	$115.4	$115.4	$115.4	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm	Program Manager	0.0	$0.0	1.3	$7.2
Intrm					
Rem					
	Personnel Total	0.0	$0.0	1.3	$7.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320I-1
Project Title: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers-Mammals and Birds
Agency: AK Dept. of Fish & Game

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1995 Federal Fiscal Year Project Budget
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	Reprt/Intrm	Remaining
Travel:	$0.0	$0.0
Intrm		
Travel Total	$0.0	$0.0
Contractual:		
RSA with the University of Alaska - Fairbanks to complete this project	$0.0	$100.1
Contractual Total	$0.0	$100.1

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Project Number: 95320I-1
Project Title: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers
Agency: AK Dept. of Fi[illegible] & Game

FORM 2B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
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Commodities:	Reprt/Intrm	Remaining
	$0.0	$0.0
Commodities Total	$0.0	$0.0
Equipment:	$0.0	$0.0
Rept		
Intrm		
Equipment Total	$0.0	$0.0

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Project Number: 95320I-1
Project Title: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers
Agency: AK Dept. of Fish & Game

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

Project Description: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers- This project contributes to the ongoing effort in ADF&G project 95064 to determine the reasons for the decline of harbor seal and stellar sea lion populations in PWS. In addition, the project seeks to better describe the trophic interactions and trophic status of marine mammals, birds and their prey species in the PWS ecosystem. The integrating methodology for the range of tasks is the use of stable isotope ratios as natural tracers of carbon and nitrogen transfers through the food webs. Carbon isotope ratios serve as conservative tracers of energy supply between trophic levels (phytoplankton to zooplankton to fishes to top consumers.

Budget Category:	1994 Project No. 94199 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96
Personnel	$0.0	$0.0	$56.9	$56.9	$56.9
Travel	$0.0	$0.0	$6.2	$6.2	$6.2
Contractual	$0.0	$0.0	$14.9	$14.9	$14.9
Commodities	$0.0	$0.0	$5.4	$5.4	$5.4
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$83.4	$83.4	$83.4
General Administration	$0.0	$0.0	$16.7	$16.7	$16.7
Project Total	$0.0	$0.0	$100.1	$100.1	$100.1
Full-time Equivalents (FTE)	0.0	0.0	1.7	1.7	1.7
Dollar amounts are shown in thousands of dollars.					

Comment	94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$0.0	$0.0	$56.9
Travel	$0.0	$0.0	$0.0	$6.2
Contractual	$0.0	$0.0	$0.0	$14.9
Commodities	$0.0	$0.0	$0.0	$5.4
Equipment	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$0.0	$83.4
General Administration	$0.0	$0.0	$0.0	$16.7
Project Total	$0.0	$0.0	$0.0	$100.1

Report writing for this project will be a condition of the contract, no additional funds will be requested for report writing.

Projected budget for FFY 96 was not provided for this project, assumed similar level of funding for next years work

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
1	D. Schell	0.0	$0.0	2.3	$24.7
1	N. Haubenstock	0.0	$0.0	3.5	$16.0
1	Ph.D. Student	0.0	$0.0	15.0	$16.2
	Personnel Total	0.0	$0.0	20.8	$56.9

NEPA Cost:	$0.0
*Oct 1, 1994 - Dec 31, 1994	
**Jan 1, 1995 - Sep 30, 1995	

Project Number: 95320I-1
Project Title: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers
Agency: University of Al - Fairbanks

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

		Reprt/Intrm	Remaining
Travel:			
Intrm	2 RT Fairbanks/Cordova @ $456 + 15 days per diem @ $140/day	$0.0	$3.0
	2 RT Fairbanks/Anchorage @ $200 + 6 days per diem @ $120/day	$0.0	$1.1
	1 RT Fairbanks/National meeting @ $1,200 + 6 days per diem @ $150/day	$0.0	$2.1
	Travel Total	$0.0	$6.2
Contractual:			
Intrm	Isotope ratio analyses 500 samples @ $15/sample	$0.0	$7.5
Intrm	Report preparation, photocopy	$0.0	$0.9
Intrm	Shipping and communications	$0.0	$0.9
	Standards, calibration/primary standards	$0.0	$0.5
	Tuition for graduate student (2 semesters)	$0.0	$5.1
	Contractual Total	$0.0	$14.9

Project Number: 95320I-1
Project Title: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers
Agency: University of Alaska- Fairbanks

FORM 4B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Glassware($1.1) and chemicals ($1.4)	$0.0	$2.5
Computer software	$0.0	$1.4
Liquid nitrogen, high purity gases	$0.0	$1.5
Commodities Total	$0.0	$5.4
Equipment:		
Rept	$0.0	$0.0
Intrm		
Equipment Total	$0.0	$0.0

Project Number: 95320I-1
Project Title: Confirming Food Web Dependencies in the PWS Ecosystem Using Stable Isotope Tracers
Agency: University of Alaska- Fairbanks

FORM 4B
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: SEA PLAN - Food Web Dependencies-Stable isotope analysis of fishes, their forage, and their prey. Taxa include herring, pink salmon, pollack, other salmonids, and lanternfish. Predators include fish, squid, and other invertebrates. Stable isotope data will be used to determine trophic position and food web relationships among species sampled and to provide associated projects the isotopic database required for data interpretation. Isotope analysis will also be integrated into the energetics and modeling studies.

Budget Category:	1994 Project No. 94320-I Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$3.0	$3.0	$85.0	
Travel	$0.0	$0.0	$0.0	$0.0	$10.1	
Contractual	$58.4	$29.4	$45.0	$74.4	$46.6	
Commodities	$0.0	$0.0	$0.0	$0.0	$5.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$58.4	$29.4	$48.0	$77.4	$146.7	
General Administration	$2.1	$0.6	$1.4	$2.0	$29.3	
Project Total	$60.5	$30.0	$49.4	$79.4	$176.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	1.2	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320I(2)
Project Title: Prince William Sound System Investigation
Sub-Project: Confirming Food Web Dependencies Using Stable Isotopes
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with PWSSC and University of Alaska - Fairbanks to conduct this project	$29.4	$45.0
Contractual Total	$29.4	$45.0

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Project Number: 95320I(2)
Project Title: Prince William Sound System Investigation
Sub-Project: Confirming Food Web Dependencies Using Stable Isotopes
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95320I(2)
Project Title: Prince William Sound System Investigation
Sub-Project: Confirming Food Web Dependencies Using Stable Isotopes
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Project Description: SEA PLAN - Food Web Dependencies-Stable isotope analysis of fishes, their forage, and their prey. Taxa include herring, pink salmon, pollack, other salmonids, and lanternfish. Predators include fish, squid, and other invertebrates. Stable isotope data will be used to determine trophic position and food web relationships among species sampled ad to provide associated projects the isotopic database required for data interpretation. Isotope analysis will also be integrated into the energetics and modeling studies.

Budget Category:	1994 Project No. 94320-I Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment	
						94 Report	95 interim
Personnel	$27.6	$13.7	$18.7	$32.4	$85.0	$13.7	$0.0
Travel	$0.6	$4.5	$5.6	$10.1	$10.1	$3.2	$1.3
Contractual	$12.6	$5.3	$11.2	$16.5	$46.6	$4.9	$0.4
Commodities	$4.9	$1.0	$1.1	$2.1	$5.0	$1.0	$0.0
Equipment	$1.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$46.7	$24.5	$36.6	$61.1	$146.7	$22.8	$1.7
General Administration	$11.7	$4.9	$8.4	$13.3	$29.3	$4.6	$0.3
Project Total	$58.4	$29.4	$45.0	$74.4	$176.0	$27.4	$2.0
Full-time Equivalents (FTE)	0.0	0.3	0.3	0.6	1.2		
	Dollar amounts are shown in thousands of dollars.					Remaining cost column general administration includes $1.0 for UAF administration of this project	

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Principal Investigator	3.0	$13.7	4.0	$18.7
Personnel Total	3.0	$13.7	4.0	$18.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

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Project Number: 95320I(2)
Project Title: Prince William Sound System Investigation
Sub-Project: Confirming Food Web Dependencies Using Stable Isotopes
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rpt	2 RT Anchorage/Cordova @ $200 + 5 days per diem for winter workshops @ $150	$1.0	$1.0
	1 RT to National meeting e.g. ASLO @ $1.2 + 5 days per diem @ $150	$0.0	$2.0
Intrm	Fall cruise RT Fairbanks/Seward @ $400 + 12 days per diem @ $150	$2.2	$0.0
Intrm	3 RT Cordova/Fairbanks @ $500 + 19 days per diem	$1.3	$2.6
Intrm			
Intrm			
Intrm			
	Travel Total	$4.5	$5.6
Contractual:			
Rpt	UAF Mass Spect '94 samples 300 @ $15	$4.5	$0.0
	UAF Mass Spect '95 samples 720 @ $15	$0.0	$10.8
Intrm	Shipping, report prep, copying, communications, computer maintenance, misc.	$0.4	$0.4
Rpt	Shipping, report prep, copying, communications, computer maintenance, misc.	$0.4	$0.0
	Contractual Total	$5.3	$11.2

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Project Number: 95320I(2)
Project Title: Prince William Sound System Investigation
Sub-Project: Confirming Food Web Dependencies Using Stable Isotopes
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Sampling supplies	$0.6	$0.7
Lab/office supplies	$0.4	$0.4
Commodities Total	$1.0	$1.1
Equipment:	$0.0	$0.0
Equipment Total	$0.0	$0.0

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Project Number: 95320I(2)
Project Title: Prince William Sound System Investigation
Sub-Project: Confirming Food Web Dependencies Using Stable Isotopes
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Sound Ecosystem Assessment - An Ecosystem Study for Prince William Sound - Information Systems and Model Development - (SEA-DATA) - for FY94, there are five SEA-DATA projects: 1) Field data communications, 2) Data management, 3) descriptive model, 4) numerical models, and 5) sampling technologies.

Budget Category:	1994 Project No. 94320-J Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$18.8	$0.0	$3.0	$3.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$701.5	$261.5	$550.9	$812.4	$0.0	
Commodities	$10.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$730.3	$261.5	$553.9	$815.4	$0.0	
General Administration	$26.2	$4.2	$16.6	$20.8	$0.0	
Project Total	$756.5	$265.7	$570.5	$836.2	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Contract with University of Alaska-Fairbanks to conduct this project	$261.5	$530.9
Contractual Total	$261.5	$530.9

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

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

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Project Number: 94320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: Sound Ecosystem Assessment - An Ecosystem Study for Prince William Sound - Information Systems and Model Development - (SEA-DATA) - for FY94, there are five SEA-DATA projects: 1) Field data communications, 2) Data management, 3) descriptive model, 4) numerical models, and 5) sampling technologies.

Budget Category:	1994 Project No. 94320-A Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$64.0	$13.5	$33.0	$46.5	$300.2	$10.3	$3.2	$58.1	$242.1
Travel	$0.0	$0.0	$4.0	$4.0	$41.8	$0.0	$0.0	$6.6	$35.2
Contractual	$10.8	$241.3	$434.9	$676.2	$96.3	$2.7	$1.6	$2.5	$93.8
Commodities	$6.8	$1.1	$5.1	$6.2	$11.3	$0.5	$0.6	$2.8	$8.5
Equipment	$13.4	$0.0	$28.0	$28.0	$119.2	$0.0	$0.0	$0.0	$119.2
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$95.0	$255.9	$505.0	$760.9	$568.8	$13.5	$5.4	$70.0	$498.8
General Administration	$23.8	$5.6	$25.9	$31.5	$113.8	$3.9	$2.7	$14.0	$99.8
Project Total	$118.8	$261.5	$530.9	$792.4	$682.6	$17.4	$8.1	$84.0	$598.6
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0					

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Budget detail not provided by PWSSC		$13.5		$33.0
Personnel Total	0.0	$13.5	0.0	$33.0

NEPA Cost: $0.0

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: University of Alaska - Fairbanks

FORM 4A
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Information not provided by the PWSSC	$0.0	$4.0
Travel Total	$0.0	$4.0
Contractual:		
Contract with University of Maryland (Contract detail not provided by PWSSC)	$12.2	$24.7
Contract with Advanced Visualization Laboratory (Contract detail not provided by PWSSC)	$7.9	$20.9
Contract with Rosenstiel School of Marine and Atmospheric Science (Contract detail not provided by PWSSC)	$80.3	$84.7
Contract with PWSSC to conduct this project (See contract detail budget sheet)	$136.6	$286.9
Contractual total for UAF (detail not provided by PWSSC)	$4.3	$17.7
Contractual Total	$241.3	$434.9

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Reprt/Intrm	Remaining
Commodities:		
Information not provided by the PWSSC	$1.1	$5.1
Commodities Total	$1.1	$5.1
Equipment:		
Information not provided by the PWSSC	$0.0	$28.0
Equipment Total	$0.0	$28.0

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Project Description: Sound Ecosystem Assessment - An Ecosystem Study for Prince William Sound - Information Systems and Model Development - (SEA-DATA) - for FY94, there are five SEA-DATA projects: 1) Field data communications, 2) Data management, 3) descriptive model, 4) numerical models, and 5) sampling technologies.

Budget Category:	1994 Project No. 94320-A Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$173.3	$89.6	$150.6	$240.2	$300.2	$38.8	$50.8	$58.1	$242.1
Travel	$27.9	$6.4	$14.0	$20.4	$41.8	$0.6	$5.8	$6.6	$35.2
Contractual	$6.3	$14.2	$62.2	$76.4	$96.1	$1.1	$13.1	$2.5	$93.6
Commodities	$2.1	$2.1	$3.4	$5.5	$11.3	$1.0	$1.1	$2.8	$8.5
Equipment	$256.6	$1.5	$11.0	$12.5	$119.2	$0.0	$1.5	$0.0	$119.2
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$466.2	$113.8	$241.2	$355.0	$568.6	$41.5	$72.3	$70.0	$498.6
General Administration	$116.6	$22.8	$45.7	$68.5	$113.7	$8.3	$14.5	$14.0	$99.7
Project Total	$582.8	$136.6	$286.9	$423.5	$682.3	$49.8	$86.8	$84.0	$598.3
Full-time Equivalents (FTE)	0.0	1.4	2.3	3.7					

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
1 Project Manager/Applies Math.	2.7	$20.6	4.8	$37.7
1 Tech admin assist./Data analyst	6.0	$31.0	6.0	$31.0
1 System administrator/Programmer	3.8	$17.6	7.0	$32.7
1 Marine systems specialist	0.5	$2.9	1.5	$8.7
2 Fish Ecologist/Numerical Analyst	1.2	$8.1	1.9	$12.2
2 Comm. Engineer/ Sci. data system spec.	1.0	$4.7	2.3	$12.0
1 Zooplankton/hardware Specialist	0.2	$1.2	1.8	$10.9
1 Grad. Research Assistant	1.8	$3.5	2.7	$5.4
Personnel Total	17.2	$89.6	28.0	$150.6

Rem includes 1.5 mo. for Scheel ($12.5)

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: Prince William Sound Science Center

FORM 4A
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Travel:	Reprt/Intrm	Remaining
Intrm	2 round trip Cordova/Fairbanks @ $456/trip + 2 days per diem @ $140/day, 2 days car rental @ $30/day	$1.3	$0.0
Rpt	1 round trip Cordova/Anchorage @ $224/trip + 2 days per diem @ $170/day, 2 days car rental @ $30/day	$0.6	$0.0
Intrm	2 round trip Cordova/Anchorage @ $224/trip + 10 days per diem @ $170/day, 6 days car rental @ $30/day	$2.3	$0.0
Intrm	1 RT Cordova/University of Maryland @$1.1	$1.1	$1.1
Intrm	1 RT Cordova/ Palo Alto @ $800 + 3 days per diem @ $102	$1.1	$0.0
Rem	2 RT Cordova/conference @ $800 + 10 days per diem @ $97 + 10 days car rental @ $30	$0.0	$2.9
Rem	4 RT Lower 48/Cordova @ $920 + 55 days per diem @ $103 + 20 days car rental	$0.0	$10.0
	Travel Total	$6.4	$14.0
	Contractual:		
Int/Rpt	Long distance telephone charges, E-mail, and facsimile	$1.1	$2.5
Int/Rpt	Copying	$0.5	$1.0
Int/Rpt	Mail, freight, and shipping	$0.6	$1.5
Rem	Annual financial audit	$0.0	$5.8
Rem	Software maintenance, license renewals (X11 for PC's $900, AVS ($3.0), IDL ($600), Autoplan ($200), Publisher ($200), productivity tools ($1,800)	$0.0	$6.7
Rem	Software data base, mass storage support tools	$0.0	$7.8
Int	Maintenance (mass storage systems $750-intr + $2,250- rem, Lan Hardware, software $250 int, $750 rem	$1.2	$2.8
Rpt	Network charges, IXC data line, Cordova-Anchorage 56 Kbs	$7.3	$21.8
Rpt	Network charges	$3.5	$12.3
Rpt			
Rpt			
Rpt			
Rpt			
Rpt			
	Contractual Total	$14.2	$62.2

Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Commodities:	Reprt/Intrm	Remaining
Inr/Rpt	Mass storage media (CD-Roms, tapes)	$0.6	$1.8
Inr/Rpt	Bond paper	$0.2	$0.3
Inr/Rpt	Toner	$0.1	$0.1
Inr/Rpt	Spare printer drum	$0.1	$0.1
Inr/Rpt	Dysub. paper, 50 page box	$0.4	$0.3
Inr/Rpt	Dysub. Transparencies, 50 page box	$0.2	$0.2
Inr/Rpt	Dysub. ribbon	$0.5	$0.6
	Commodities Total	$2.1	$3.4
	Equipment:		
Intr	Remote communications hardware - Survey vessel system	$0.0	$3.8
	Remote communications hardware - Buoy stystem	$0.0	$3.8
	Remote communications hardware - Ship of opportunity	$0.0	$2.3
	Uninterruptible power supply	$0.0	$0.5
	Network hardware - Ehernet cards, 5-pack	$0.0	$0.6
Intrm	Network hardware - dial-in annex	$1.0	$0.0
Intrm	Network hardware - cable and connectors	$0.5	$0.0
	Equipment Total	$1.5	$11.0

Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Project Description: Sound Ecosystem Assessment - An Ecosystem Study for Prince William Sound - Information Systems and Model Development - (SEA-DATA) - for FY94, there are five SEA-DATA projects: 1) Field data communications, 2) Data management, 3) descriptive model, 4) numerical models, and 5) sampling technologies.

Budget Category:	1994 Project No. 94320-A Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$3.0	$3.0		
Travel	$0.0	$0.0	$0.0	$0.0		
Contractual	$701.5	$261.5	$530.9	$792.4		
Commodities	$0.0	$0.0	$0.0	$0.0		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$701.5	$261.5	$533.9	$795.4	$0.0	
General Administration	$23.4	$6.8	$14.0	$20.8		
Project Total	$724.9	$268.3	$547.9	$816.2	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager			0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: AK Dept. of Fish & Game

FORM 3A-1
SUB-PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with the UAF (See detailed budget sheet for this project component)	$261.5	$530.9
Contractual Total	$261.5	$530.9

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: AK Dept. of Fish & Game

FORM 3B-1
SUB-PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: AK Dept. of Fish & Game

FORM 3B-1
SUB-PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description:

Budget Category:	1994 Project No. 95320-A Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$18.8	$0.0	$0.0	$0.0		
Travel	$0.0	$0.0	$0.0	$0.0		Detailed information involving this budget was not provided by PWSSC. All fund for this subcomponent have been placed in line 300.
Contractual	$0.0	$0.0	$20.0	$20.0		
Commodities	$10.0	$0.0	$0.0	$0.0		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$28.8	$0.0	$20.0	$20.0	$0.0	
General Administration	$2.8	$0.0	$0.0	$0.0	$0.0	
Project Total	$31.6	$0.0	$20.0	$20.0	$25.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Information not provided by PWSSC.				
Personnel Total	0.0	$0.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

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Project Number: 94320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: Dept. of Interior, National Biological Survey

FORM 3A-2
SUB-PROJECT DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Information not provided by PWSSC.		
Travel Total	$0.0	$0.0
Contractual:		
Information not provided by PWSSC.		$20.0
Contractual Total	$0.0	$20.0

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: Dept. of Interior, National Biological Survey

FORM 3B-2
SUB-
PROJECT
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Information not provided by PWSSC.		
Commodities Total	$0.0	$0.0
Equipment:		
Information not provided by PWSSC		
Equipment Total	$0.0	$0.0

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1995

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Project Number: 95320J
Project Title: Prince William Sound System Investigation
Sub-Project: Information and Modeling
Agency: Dept. of Interior, National Biological Survey

FORM 3B-2
SUB-
PROJECT
DETAIL

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

Project Description: Sea Plan - PWS System Investigation- Experimental Release - This project is part of the SEA ecosystem study. Approximately 16,000,000 pink salmon fry will be reared at two hatcheries to 1.5 grams for a late spring release in 1995. This project will measure the influence of size at ocean-entry and time of ocean entry on growth and mortality.

Budget Category:	1994 Project No. 94320-K Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$3.4	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$30.0	$0.0	$43.8	$43.8	$49.9	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$33.4	$0.0	$43.8	$43.8	$49.9	
General Administration	$2.6	$0.0	$3.5	$3.5	$3.5	
Project Total	$36.0	$0.0	$47.3	$47.3	$53.4	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95320K
Project Title: Prince William Sound System Investigation
Sub-Project: Experimental Fry Release
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Contract with PWSAC to raise and release 16,000,000 1.5 gram pink salmon fry into PWS	$0.0	$43.8
Contractual Total	$0.0	$43.8

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Project Number: 95320K
Project Title: Prince William Sound System Investigation
Sub-Project: Experimental Fry Release
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

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

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1995

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Project Number: 95320K
Project Title: Prince William Sound System Investigation
Sub-Project: Experimental Fry Release
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Project Description: Sea Plan - PWS System Investigation- Experimental Release - This project is part of the SEA ecosystem study. Approximately 16,000,000 pink salmon fry will be reared at two hatcheries to 1.5 grams for a late spring release in 1995. This project will measure the influence of size at ocean-entry and time of ocean entry on growth and mortality.

Budget Category:	1994 Project No. 94320-A Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$1.0	$0.0	$1.0	$1.0	$1.5	$0.0	$0.0	$0.0	$1.5
Travel	$0.0	$0.0	$1.1	$1.1	$1.6	$0.0	$0.0	$0.0	$1.6
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Commodities	$40.0	$0.0	$35.6	$35.6	$40.4	$0.0	$0.0	$0.0	$40.4
Equipment	$4.0	$0.0	$4.0	$4.0	$4.0	$0.0	$0.0	$0.0	$4.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$45.0	$0.0	$41.7	$41.7	$47.5	$0.0	$0.0	$0.0	$47.5
General Administration	$0.0	$0.0	$2.1	$2.1	$2.4	$0.0	$0.0	$0.0	$2.4
Project Total	$45.0	$0.0	$43.8	$43.8	$49.9	$0.0	$0.0	$0.0	$49.9
Full-time Equivalents (FTE)	0.1	0.0	0.1	0.1	0.1				

Dollar amounts are shown in thousands of dollars.

94 and 95 report costs are conditionsof the contract, therefore, no additional funds are requested for the 94 and 95 reports..

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Temporary Technicians 100 hours @ $10/hour	0.0	$0.0	0.8	$1.0
Personnel Total	0.0	$0.0	0.8	$1.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320K
Project Title: Prince William Sound System Investigation
Sub-Project: Experimental Fry Release
Agency: Prince William Sound Aquaculture Corporation

FORM 4B SUB-PROJECT CONTRACTUAL DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
2 RT Anchorage/Cordova @ $250 + 4 days per diem @ $150	$0.0	$1.1
Travel Total	$0.0	$1.1
Contractual:		
	$0.0	$0.0
Contractual Total	$0.0	$0.0

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1995

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Project Number: 95320K
Project Title: Prince William Sound System Investigation
Sub-Project: Experimental Fry Release
Agency: Prince William Sound Aquaculture Corporation

FORM 4B
SUB-
PROJECT
CONTRACTUAL
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Fish food - 22,100 kg @ $1.60/kg	$0.0	$35.3
Computer software (Excel and Windows)	$0.0	$0.3
Commodities Total	$0.0	$35.6
Equipment:		
Coded wire tags - 80,000 @ $0.05/tag to identify fish during adult recovery to determine marine survival of release group	$0.0	$4.0
Equipment Total	$0.0	$4.0

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1995

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Project Number: 95320K
Project Title: Prince William Sound System Investigation
Sub-Project: Experimental Fry Release
Agency: Prince William Sound Aquaculture Corporation

FORM 4B
SUB-
PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Sound Ecosystem Assessment- An Ecosystem Study of Prince William Sound Physical Oceanography (SEA-OCEAN) - a descriptive physical oceanography of Prince William Sound and the Northern Gulf of Alaska.

Budget Category:	1994 Project No. 94320-M Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$3.0	$3.0	$273.1	
Travel	$0.0	$0.0	$0.0	$0.0	$10.3	
Contractual	$0.0	$134.2	$426.1	$560.3	$22.5	
Commodities	$0.0	$0.0	$0.0	$0.0	$6.5	
Equipment	$0.0	$0.0	$0.0	$0.0	$125.5	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$134.2	$429.1	$563.3	$437.9	
General Administration	$0.0	$4.5	$10.0	$14.5	$87.6	
Project Total	$0.0	$138.7	$439.1	$577.8	$525.5	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
RSA with UAF and PWSSC to conduct a physical oceanography study in PWS	$134.2	$426.1
Contractual Total	$134.2	$426.1

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1995

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Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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1995

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Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Project Description: Sound Ecosystem Assessment- An Ecosystem Study of Prince William Sound Physical Oceanography (SEA-OCEAN) - a descriptive physical oceanography of Prince William Sound and the Northern Gulf of Alaska.

Budget Category:	1994 Project No. 94320-M Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$25.5	$0.0	$8.2	$8.2	$0.0	
Travel	$3.6	$0.0	$0.0	$0.0	$0.0	
Contractual	$70.4	$132.7	$412.4	$545.1	$0.0	
Commodities	$0.7	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$100.2	$132.7	$420.6	$553.3	$0.0	
General Administration	$25.1	$1.5	$5.5	$7.0	$0.0	
Project Total	$125.3	$134.2	$426.1	$560.3	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
UAF Program Manager	0.0	$0.0	1.0	$8.2
Personnel Total	0.0	$0.0	1.0	$8.2

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: University of Alaska - Fairbanks

FORM 4A
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Contract with the PWSSC	$132.7	$412.4
Contractual Total	$132.7	$412.4

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1995

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Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

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

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Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Sound Ecosystem Assessment- An Ecosystem Study of Prince William Sound Physical Oceanography (SEA-OCEAN) - a descriptive physical oceanography of Prince William Sound and the Northern Gulf of Alaska.

Budget Category:	1994 Project No. 94320-m Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	95 Interim	95 Report	96 Field
Personnel	$0.0	$93.7	$188.4	$282.1	$273.1	$76.5	$17.2	$76.5	$196.6
Travel	$0.0	$0.9	$9.4	$10.3	$10.3	$0.9	$0.0	$0.9	$9.4
Contractual	$0.0	$2.5	$16.0	$18.5	$22.5	$2.5	$0.0	$6.5	$16.0
Commodities	$0.0	$2.1	$4.4	$6.5	$6.5	$2.1	$0.0	$2.1	$4.4
Equipment	$0.0	$11.4	$125.5	$136.9	$125.5	$0.0	$11.4	$0.0	$125.5
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$110.6	$343.7	$454.3	$437.9	$82.0	$28.6	$86.0	$351.9
General Administration	$0.0	$22.1	$68.7	$90.8	$87.6	$16.4	$5.7	$17.2	$70.4
Project Total	$0.0	$132.7	$412.4	$545.1	$525.5	$98.4	$34.3	$103.2	$422.3
Full-time Equivalents (FTE)	0.0	1.4	2.3	3.7	0.0				

Dollar amounts are shown in thousands of dollars.

96 field budget was not received prior to this deadline, assume same level funding as FFY94.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	
1 Physical Oceanographer (1 month interim)	5.0	$36.7	7.0	$59.3	Includes $8.0 for sea pay
1 Technician (1 month interim)	5.0	$24.6	7.0	$42.5	Includes $8.0 for sea pay
1 Technician (1 month interim)	5.0	$24.6	7.0	$42.5	Includes $8.0 for sea pay
1 Technician Assistant	2.0	$7.8	4.0	$15.5	
1 Marine Engineer	0.0	$0.0	2.0	$21.3	
1 Physical oceanographer	0.0	$0.0	1.0	$7.3	
Personnel Total	17.0	$93.7	28.0	$188.4	

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

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Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: Prince William Sound Science Center

FORM 4A
SUB-PROJECT
CONTRACTUAL
DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rpt	1 RT Cordova/Fairbanks @ $456/trip + 3 days per diem @$140	$0.9	$0.0
	3 RT Cordova/Fairbanks @ $465 + 13 days per diem @ $150	$0.0	$3.2
	10 RT Cordova/PWS @ $500	$0.0	$5.0
	1 RT Seattle/Cordova @ $778	$0.0	$0.8
	2 RT Cordova/Anchorage @ $225	$0.0	$0.4
	Travel Total	$0.9	$9.4
Contractual:			
Rpt	Publishing, Binding	$2.0	$0.0
	Equipment recalibration	$0.0	$2.2
	Shipping Insurance	$0.0	$3.0
Rpt	Phone, FAX, and copying	$0.5	$1.0
	Mail and E-mail	$0.0	$0.5
	Audit	$0.0	$3.3
	Acoustic command gear lease	$0.0	$6.0
	Contractual Total	$2.5	$16.0

Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Commodities:	Reprt/Intrm	Remaining
Rpt	Office supplies	$0.5	$0.5
	Marine hardware	$0.0	$1.0
Rpt	Analytical software	$0.8	$0.2
Rpt	Statistical Software	$0.8	$0.2
	3 Survival suits	$0.0	$1.5
	Computer supplies, floppy disks	$0.0	$1.0
	Commodities Total	$2.1	$4.4
	Equipment:		
	ADCP battery packs	$0.0	$7.5
	Research vessel	$0.0	$80.0
Intrm	Satellite tracked drifters	$9.0	$15.0
	Winches	$0.0	$0.0
Intrm	Meter Blocks	$2.4	$0.0
	Portable computers	$0.0	$6.0
	Aandera current meter	$0.0	$15.0
	Chains, buoys, lines, mooring	$0.0	$2.0
	Equipment Total	$11.4	$125.5

Project Number: 95320M
Project Title: Prince William Sound System Investigation
Sub-Project: Met/Phys. Oceanography
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Sound Ecosystem Assessment - Nearshore Fish (SEA-FISH) -The goals of this project are to: 1) increase the understanding of the processes that determine the abundance of key animal populations in PWS, focusing initially on pink salmon and Pacific herring, 2) develop and apply new methods and technologies for evaluating life history parameters of key marine and occurring populations important to evaluating the productivity and ecological health of PWS, and 3) improve the ability to predict how the abundance of key animal population change.

Budget Category:	1994 Project No. 94320 -N Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$3.0	$0.0	$3.0	$3.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$645.8	$399.3	$217.1	$616.4	$616.4	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$645.8	$402.3	$217.1	$619.4	$619.4	
General Administration	$21.1	$10.8	$5.0	$15.8	$15.8	
Project Total	$666.9	$413.1	$222.1	$635.2	$635.2	
Full-time Equivalents (FTE)	0.0	3.8	1.8	5.6	4.2	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.5	$3.0	0.0	$0.0
Personnel Total	0.5	$3.0	0.0	$0.0

NEPA Cost:	$0.0
*Oct 1, 1994 - Dec 31, 1994	
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1995

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Project Number: 95320N
Project Title: Prince William Sound System Investigation
Sub-Project: Nearshore Fish
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
RSA with PWSSC to conduct the nearshore fish study	$399.3	$217.1
Contractual Total	$399.3	$217.1

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Project Number: 95320N
Project Title: Prince William Sound System Investigation
Sub-Project: Nearshore Fish
Agency: AK Dept. of Fi[illegible] & Game

FORM 2A
PROJECT
DETAIL

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

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

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1995

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Project Number: 95320N
Project Title: Prince William Sound System Investigation
Sub-Project: Nearshore Fish
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Project Description: Sound Ecosystem Assessment - Nearshore Fish (SEA-FISH) -The goals of this project are to: 1) increase the understanding of the processes that determine the abundance of key animal populations in PWS, focusing initially on pink salmon and Pacific herring, 2) develop and apply new methods and technologies for evaluating life history parameters of key marine and occurring populations important to evaluating the productivity and ecological health of PWS, and 3) improve the ability to predict how the abundance of key animal population change.

Budget Category:	1994 Project No. 94320-N Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment			
						94 Report	95 Interim	95 Report	96 Field
Personnel	$167.8	$231.7	$146.5	$378.2	$378.2	$134.8	$96.9	$134.8	$146.5
Travel	$51.5	$8.7	$19.3	$28.0	$28.0	$5.0	$3.7	$5.0	$19.3
Contractual	$11.7	$28.4	$0.0	$28.4	$28.4	$22.4	$6.0	$22.4	$0.0
Commodities	$14.7	$12.9	$4.1	$17.0	$17.0	$3.9	$9.0	$3.9	$4.1
Equipment	$270.9	$51.0	$6.0	$57.0	$57.0	$0.0	$51.0	$0.0	$6.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$516.6	$332.7	$175.9	$508.6	$508.6	$166.1	$166.6	$166.1	$175.9
General Administration	$129.2	$66.6	$41.2	$107.8	$107.8	$33.2	$33.4	$33.2	$41.2
Project Total	$645.8	$399.3	$217.1	$616.4	$616.4	$199.3	$200.0	$199.3	$217.1
Full-time Equivalents (FTE)	0.0	3.8	1.8	5.6	4.2	Remaining GA includes $7.7 GA for UAF .			
	Dollar amounts are shown in thousands of dollars.					Budget for FFY 96 not submitted by dead-			

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	
Principal Investigator (4 mo.Rpt@ 29.1	4.0	$41.8	2.0	$33.3	44 days Seapay ($3.0 intrm, $9.1 remaining)
Electrical Engineer (3 months interim)	9.0	$46.7	3.0	$25.5	66 days Seapay ($2.3 intrm, $6.9 remaining)
Acoustician (3 months interim)	9.0	$46.7	3.0	$25.5	66 days Seapay ($2.3 intrm, $6.9 remaining)
Fishery Biologist II (3 months interim)	9.0	$44.5	3.0	$27.8	66 days Seapay ($0.0 intrm, $9.3 remaining)
Technician I (3 months interim)	10.0	$33.8	2.0	$5.3	66 days Seapay ($0.0 intrm, $5.3 remaining)
Technician I (3months interim)	4.0	$18.2	8.0	$20.9	66 days Seapay ($1.3 intrm, $4.0 remaining)
UAF Program Manager	0.0	$0.0	1.0	$8.2	NEPA Cost: $0.0
Personnel Total	45.0	$231.7	22.0	$146.5	*Oct 1, 1994 - Dec 31, 1994
					**Jan 1, 1995 - Sep 30, 1995

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

	Reprt/Intrm	Remaining
Travel:		
2 RT Cordova/Juneau @ $352/trip + 8 days per diem @ $128/day + 8 days car rental ($240)	$0.0	$2.0
3 RT Cordova/Anchorage @ $224/trip + 20 days per diem @ $170/day +20 days car rental ($600)	$4.7	$0.0
1 RT Cordova/Fairbanks @ $456/trip + 4 days per diem @ $140/day + 4 days car rental ($120)	$0.0	$1.1
PWS air charters (40 hours @ 230/hour)	$0.0	$9.2
3 round trips Cordova/Seattle @ $778/trip + 10 days per diem @ $134 + 10 days car rental ($300)	$4.0	$0.0
2 RT Cordova/Aberdeen @ $1,683/trip + 20days per diem @ $153/day +20 days car rental ($600)		$7.0
Travel Total	$8.7	$19.3
Contractual:		
Audit	$4.4	$0.0
Long distance telephone charges	$3.5	$0.0
Facsimile	$3.5	$0.0
Copying	$4.5	$0.0
Mail, freight, shipping	$3.8	$0.0
Office Equipment maintenance and repair	$3.4	$0.0
Electronic Mail and communication costs	$5.3	$0.0
Contractual Total	$28.4	$0.0

Project Number: 95320N
Project Title: Prince William Sound System Investigation
Sub-Project: Nearshore Fish
Agency: Prince William Sound Science Center

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

Commodities:	Reprt/Intrm	Remaining
Analytical, communications and statistical software	$1.5	$0.0
4 UPS (power supplies) @ $250/each	$1.2	$0.0
Foul weather gear	$0.0	$1.2
Electronics/Mechanical tools	$2.0	$0.0
Marine hardware	$2.7	$0.0
Office supplies	$2.4	$0.0
Video tapes, disks, film	$0.0	$2.9
Calibration and maintenance	$3.1	$0.0
Commodities Total	$12.9	$4.1
Equipment:		
Biosonics DT6000, split beam, 70 kHz sonar	$36.0	$0.0
Sun workbook	$10.0	$0.0
Laser printer	$0.0	$3.0
Data storage system	$5.0	$0.0
Infocus screen projection system	$0.0	$3.0
Equipment Total	$51.0	$6.0

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Project Number: 95320N
Project Title: Prince William Sound System Investigation
Sub-Project: Nearshore Fish
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1994 - September 30, 1995

Project Description: Sea Plan- Avian Predation on Herring Spawn - This ongoing project will assess the effects of avian predation on Pacific Herring reproduction in Prince William Sound. The data will be integrated in a model of Pacific Herring survival and recruitment. Additionally, this project will assess the importance of herring roe to avian species breeding in the Prince William Sound area and using the herring spawn locations as migratory stopover areas.

Budget Category:	1994 Project No. 94320-Q Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$31.2	$17.3	$46.5	$63.8	$22.2	
Travel	$0.0	$1.4	$0.9	$2.3	$1.4	
Contractual	$20.5	$1.7	$12.6	$14.3	$3.0	
Commodities	$10.4	$0.0	$5.6	$5.6	$0.5	
Equipment	$16.7	$0.0	$2.5	$2.5	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$78.8	$20.4	$68.1	$88.5	$27.1	
General Administration	$6.1	$2.7	$7.8	$10.5	$3.5	
Project Total	$84.9	$23.1	$75.9	$99.0	$30.6	
Full-time Equivalents (FTE)	0.0	0.4	1.3	1.7	0.5	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost	Comment
1	Research Wildlife Biologist	2.5	$12.5	2.5	$12.5	Additional 2 mo. of in-kind salary
1	Wildlife Technician (GS-7)	2.0	$4.8	3.5	$9.4	Additional $1.0 OT, 1 mo. in-kind salary
1	Wildlife Technician (GS-7)	0.0	$0.0	2.8	$7.6	Additional $1.0 of field overtime
1	Wildlife Technician (GS-7)	0.0	$0.0	2.3	$6.5	Additional $1.0 of field overtime
1	Wildlife Technician (GS-7)	0.0	$0.0	2.3	$5.4	
1	Wildlife Technician (GS-7)	0.0	$0.0	2.3	$5.1	Additiona $0.6 of field overtime
	Personnel Total	4.5	$17.3	15.7	$46.5	

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320Q
Project Title: Prince William Sound System Investigation
Sub-Project: Avian Predation
Agency: Dept. of Agriculture, Forest Service, Copper River Delta

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rpt	2 RT Cordova/Anchorage @$200 +7 days per diem @$140	$1.4	$0.0
Rem	2 RT Cordova/Anchorage @$200 +4 days per diem @$140	$0.0	$0.9
	Travel Total	$1.4	$0.9
Contractual:			
	Contract for biometrician	$1.7	$1.8
	Air charter for aerial surveys (approx. 11 - 3.0 hour flights @ $230/hr)		$7.9
	Analysis of stomach contents (60 stomachs @ $15/stomach)	$0.0	$0.9
	Transportation to site 2 RT @ $1.0	$0.0	$2.0
	Contractual Total	$1.7	$12.6

Project Number: 95320Q
Project Title: Prince William Sound System Investigation
Sub-Project: Avian Predation
Agency: Dept. of Agriculture, Forest Service, Copper River Delta

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

Commodities:	Reprt/Intrm	Remaining
Food and sundries for 4 people for 40 days @ $15/day	$0.0	$2.4
4 tarps ($240), 4 dry boxes ($400)	$0.0	$0.6
Propane	$0.0	$0.1
Misc. lumber	$0.0	$0.1
wing cord rule($40), office supplies($50)	$0.0	$0.1
Dissection Kit	$0.0	$0.1
Scales 3 @ $45	$0.0	$0.1
Calipers	$0.0	$0.1
Immersion Suit	$0.0	$0.3
4 pairs insulated waders	$0.0	$0.2
Gasoline 200 gallons @ $1.70/gallon	$0.0	$0.3
Plastic fuel barrel, Barrel pump repair	$0.0	$0.1
Rope	$0.0	$0.1
General boat maintenance ($800), 3 gas cans ($120), boat tool kit ($50)	$0.0	$1.0
Commodities Total	$0.0	$5.6
Equipment:		
Oil stove	$0.0	$0.4
Hard hat w/face shield and muffs and Kevlar chaps	$0.0	$0.1
Boat windshield	$0.0	$0.2
Boat seats	$0.0	$0.3
Blinds (2 @ $200/each)	$0.0	$0.4
Rifle, .22-cal, w/scope	$0.0	$0.2
Microphones (6 @ $42/each)	$0.0	$0.3
camera w/50-55mm lens	$0.0	$0.6
Equipment Total	$0.0	$2.5

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Project Number: 95320Q
Project Title: Prince William Sound System Investigation
Sub-Project: Avian Predation
Agency: Dept. of Agriculture, Forest Service, Copper River Delta

FORM 2A
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Project Description: Herring Disease and Ecotoxicology: This budget acts as a place holder for the contract to conduct the investigation of the disease toxicology of the herring in Prince William Sound. This will be accomplished using a two step process, by which a proposal will be made using information obtained in an expression of interest (step one), and bids will be made by those contractors expressing interest to the proposal made in step one (step two). The proposal will address the cause of massive herring mortalities in PWS. The virus which causes viral hemorrhagic septicemia was isolated from these fish in 1993 and similar lesions were investigated in 1994. This project attempts to determine whether the virus is associated with precipitous herring population declines.

Budget Category:	1994 Project No. 95320-S Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$19.4	$4.2	$8.4	$12.6	$9.0	
Travel	$3.7	$0.0	$2.5	$2.5	$0.0	
Contractual	$62.3	$124.0	$356.0	$480.0	$350.0	
Commodities	$4.3	$9.0	$9.0	$18.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$89.7	$137.2	$375.9	$513.1	$359.0	
General Administration	$7.3	$9.3	$20.9	$30.2	$20.9	
Project Total	$97.0	$146.5	$396.8	$543.3	$379.9	
Full-time Equivalents (FTE)	0.3	0.1	0.2	0.2	0.1	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept					
Rem	Fish & Wildlife technician	0.0	$0.0	1.0	$2.4
Rem	Program Manager	0.8	$4.2	1.0	$6.0
	Personnel Total	0.8	$4.2	2.0	$8.4

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320-S
Project Title: Disease Impacts on Prince William Sound Herring Populations
Agency: AK Dept. of Fish & Game

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm			
Rem	3 RT Cordova/Sitka @ $600/trip	$0.0	$1.8
	5 RT Cordova/RV Montague @ $140/trip	$0.0	$0.7
	Travel Total	$0.0	$2.5
Contractual:			
	Contract for 2 vessel charters in PWS for 5 days @ $1.2/day/boat	$12.0	$6.0
	Contract for 2 vessel charters in Sitka Sound during the spring and fall for 2 trips X 2 boats X 3 days @ $1.5/day	$18.0	$0.0
	Contract with Med Veterinary Lab for hematology sample analysis 160 samples @ $22/sample	$3.5	$0.0
	Contract with the University of California for histopathology analysis 160 samples @ $246.80/fish	$39.5	$0.0
	Contract with the University of California for proximate analysis 96 samples @ $60/sample	$5.8	$0.0
	Contract with unknown contractor for FFY 95 field season (this contract will be awarded in November using a two step process.)	$0.0	$350.0
Rept			
	Contract with University of California for report writing for the FFY94 field season	$45.2	$0.0
	Contractual Total	$124.0	$356.0

Project Number: 95320-S
Project Title: Disease Impacts on Prince William Sound Herring Populations
Agency: AK Dept. of Fi[illegible] & Game

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

Commodities:	Reprt/Intrm	Remaining
Rept		
Rem Formalin, AWL supplies, labels, shipping	$1.0	$1.0
Virus isolation, bacteriology, and analysis for VEN, 160 samples @ $25/sample for media and plastic ware for 2 locations	$8.0	$8.0
Commodities Total	$9.0	$9.0
Equipment:		
Rept	$0.0	$0.0
Intrm		
Equipment Total	$0.0	$0.0

Project Number: 95320-S
Project Title: Disease Impacts on Prince William Sound Herring Populations
Agency: AK Dept. of Fish & Game

FORM 2B
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EXXON VALDEZ TRUSTEE COUNCIL
1995 Federal Fiscal Year Project Budget
October 1, 1994 - September 30, 1995

Project Description: Herring Disease and Ecotoxicology: This budget acts as a place holder for the contract to conduct the investigation of the disease toxicology of the herring in Prince William Sound. This will be accomplished using a two step process, by which a proposal will be made using information obtained in an expression of interest (step one), and bids will be made by those contractors expressing interest to the proposal made in step one (step two). The proposal will address the cause of massive herring mortalities in PWS. The virus which causes viral hemorrhagic septicemia was isolated from these fish in 1993 and similar lesions were investigated in 1994. This project attempts to determine whether the virus is associated with precipitous herring population declines.

Budget Category:	1994 Project No. 95320-S Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$19.4	$26.0	$0.0	$26.0	$0.0	
Travel	$3.7	$4.5	$0.0	$4.5	$0.0	
Contractual	$62.3	$0.0	$0.0	$0.0	$0.0	
Commodities	$4.3	$3.0	$0.0	$3.0	$0.0	
Equipment	$0.0	$6.0	$0.0	$6.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$89.7	$39.5	$0.0	$39.5	$0.0	
General Administration	$7.3	$5.7	$0.0	$5.7	$0.0	
Project Total	$97.0	$45.2	$0.0	$45.2	$0.0	
Full-time Equivalents (FTE)	0.3	0.5	0.0	0.5	0.1	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept 2 Pathologist	3.0	$17.4	0.0	$0.0
Rept Secretary	2.4	$5.6	0.0	$0.0
Rept Biometrician	0.5	$3.0	0.0	$0.0
Rept				
Personnel Total	5.9	$26.0	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320-S
Project Title: Disease Impacts on Prince William Sound Herring Populations
Agency: AK Dept. of Fish & Game

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

		Reprt/Intrm	Remaining
Travel:			
Rept	2 RT UCal-Davis/Sitka/Cordova @ $1.5/trip + 15 days per diem	$4.5	$0.0
	Travel Total	$4.5	$0.0
Contractual:			
Rept Intrm	None	$0.0	$0.0
	Contractual Total	$0.0	$0.0

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Project Number: 95320-S
Project Title: Disease Impacts on Prince William Sound Herring Populations
Agency: AK Dept. of Fish & Game

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Lab sampling, photography, reports	$3.0	$0.0
	Commodities Total	$3.0	$0.0
Equipment:			
Rept	Centrifuge with microhematocrit and Eppendorf capabilities	$3.0	$0.0
Rept	Refractometer for total protein	$1.0	$0.0
Rept	Computer for spreadsheet, graphics and word processing	$2.0	$0.0
Rept			
Rept			
	Equipment Total	$6.0	$0.0

Project Number: 95320-S
Project Title: Disease Impacts on Prince William Sound Herring Populations
Agency: AK Dept. of Fi[illegible] & Game

FORM 4B
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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: SEA PLAN: This project is designed to determine juvenile herring distribution over space and time comparing site-specific differences in prey selection, growth, age structure, and predation. Habitat characteristics, including physical characteristics and the incidence of co-existing species, that are important or deterministic to distribution, growth, and survival will be documented. Understanding the precesses affecting the population parameters of this critical life stage is essential in understanding herring recruitment and recovery. Much of the data needed for this project is collected by other projects including Salmon and Herring Integration and Nearshore Fish Distribution of SEA and the forage fish project under contract by NOAA.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 96 Field	Comment 95 Report
Personnel	$0.0	$0.0	$58.1	$58.1	$31.2	$101.9	$31.2
Travel	$0.0	$0.0	$2.0	$2.0	$0.0	$6.0	$0.0
Contractual	$0.0	$0.0	$248.8	$248.8	$0.0	$345.0	$0.0
Commodities	$0.0	$0.0	$6.3	$6.3	$0.0	$13.0	$0.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$48.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$315.2	$315.2	$31.2	$513.9	$31.2
General Administration	$0.0	$0.0	$25.1	$25.1	$4.7	$34.7	$4.7
Project Total	$0.0	$0.0	$340.3	$340.3	$35.9	$548.6	$35.9
Full-time Equivalents (FTE)	0.0	0.0	0.8	0.8	0.0		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Intrm Fishery Biologist II	0.0	$0.0	4.0	$32.2
Rem Fish and Wildlife Technician III	0.0	$0.0	3.0	$19.4
2 Fish and Wildlife Technician II	0.0	$0.0	2.0	$6.5
Personnel Total	0.0	$0.0	9.0	$58.1

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95320T
Project Title: Prince William Sound System Investigation
Sub-Project: Juvenile Herring Growth
Agency: AK Dept. of Fish & Game

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October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
2 RT Cordova/Anchorage @ $350 + 11 days per diem to attend winter workshops/planning	$0.0	$0.0
2 RT Cordova/Anchorage @ $350 + 11 days per diem for training-scientific meetings/research synthesis	$0.0	$2.0
Travel Total	$0.0	$2.0
Contractual:		
RSA with UAF RSA will be broken out by line item as follows:	$0.0	$94.0
Vessel charter for 100 days @ $1000	$0.0	$100.0
Aerial Surveys and GIS Mapping	$0.0	$18.8
Contract for Inseason Acoustics and Signal Processing/DataAnalysis	$0.0	$36.0
Contractual Total	$0.0	$248.8

	Reprt/Intrm	Remaining
100	$0.0	$66.0
200	$0.0	$6.5
300	$0.0	$0.0
400	$0.0	$5.8
500	$0.0	$0.0
Subtotal	$0.0	$78.3
UAF GA	$0.0	$15.7
RSA Tot.	$0.0	$94.0

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Project Number: 95320T
Project Title: Prince William Sound System Investigation
Sub-Project: Juvenile Herring Growth
Agency: AK Dept. of Fish & Game

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Commodities:		
Office Supplies/Publication costs	$0.0	$1.5
Net and Fishing Gear Supplies	$0.0	$0.8
Food for 3 people for approximately 33 days @ $15/day	$0.0	$2.0
Software upgrades/Network fees	$0.0	$1.5
	$0.0	$0.5
Commodities Total	$0.0	$6.3
Equipment:		
All needed equipment will be borrowed from other projects		
Equipment Total	$0.0	$0.0

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Project Number: 95320T
Project Title: Prince William Sound System Investigation
Sub-Project: Juvenile Herring Growth
Agency: AK Dept. of Fish & Game

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1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: Somatic and Spawning Energetics of Herring and Pollock- This project will focus on the seasonal somatic energy cycles of two important forage species in the EVOS region, the Pacific herring and the walleye pollock. The project will also explore over winter survival of juvenile herring and herring reproductive biology. Historically, herring and pollock have been among the most abundant pelagic forage fishes in south central Alaska. After the Exxon Valdez oil spill the herring population of Prince William sound has been exhibiting reduced abundance, disease, and spawning anomalies that may be related to pollution.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$3.0	$3.0		
Travel	$0.0	$0.0	$0.0	$0.0		
Contractual	$0.0	$0.0	$92.6	$92.6		
Commodities	$0.0	$0.0	$0.0	$0.0		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$95.6	$95.6	$0.0	
General Administration	$0.0	$0.0	$3.8	$3.8		
Project Total	$0.0	$0.0	$99.4	$99.4	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Project Manager	0.0	$0.0	0.5	$3.0
Personnel Total	0.0	$0.0	0.5	$3.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95320U
Project Title: Prince William Sound System Investigation
Sub-Project: Bioenergetics of Herring and Pollock
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
Contract with UAF to conduct this project	$0.0	$92.6
Contractual Total	$0.0	$92.6

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Project Number: 95320U
Project Title: Prince William Sound System Investigation
Sub-Project: Bioenergetics of Herring and Pollock
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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1995

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Project Number: 95320U
Project Title: Prince William Sound System Investigation
Sub-Project: Bioenergetics of Herring and Pollock
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

Project Description: Somatic and Spawning Energetics of Herring and Pollock- This project will focus on the seasonal somatic energy cycles of two important forage species in the EVOS region, the Pacific herring and the walleye pollock. The project will also explore over winter survival of juvenile herring and herring reproductive biology. Historically, herring and pollock have been among the most abundant pelagic forage fishes in south central Alaska. After the Exxon Valdez oil spill the herring population of Prince William sound has been exhibiting reduced abundance, disease, and spawning anomalies that may be related to pollution.

Budget Category:	1994 Project No. Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$65.7	$65.7	$0.0	
Travel	$0.0	$0.0	$7.0	$7.0	$0.0	
Contractual	$0.0	$0.0	$2.5	$2.5	$0.0	
Commodities	$0.0	$0.0	$1.0	$1.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$76.2	$76.2	$0.0	
General Administration	$0.0	$0.0	$16.4	$16.4	$0.0	
Project Total	$0.0	$0.0	$92.6	$92.6	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.9	0.9	0.0	

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
A.J. Paul	0.0	$0.0	4.0	$32.1
J. McDonald	0.0	$0.0	6.7	$33.6
Personnel Total	0.0	$0.0	10.7	$65.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95320U
Project Title: Prince William Sound System Investigation
Sub-Project: Bioenergetics of Herring and Pollock
Agency: University of Alaska - Fairbanks

FORM 4A
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

	Reprt/Intrm	Remaining
Travel:		
2 RT Anchorage/Seward @ $250 + 10 days per diem for workshops	$0.0	$2.0
5 field trips Seward/PWS + per diem @ $1000/trip	$0.0	$5.0
Travel Total	$0.0	$7.0
Contractual:		
Long distance phone charges	$0.0	$0.5
Shipping of equipment and samples	$0.0	$2.0
Contractual Total	$0.0	$2.5

Project Number: 95320U
Project Title: Prince William Sound System Investigation
Sub-Project: Bioenergetics of Herring and Pollock
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Office supplies (paper, toner, pens, markers, etc.)	$0.0	$1.0
Commodities Total	$0.0	$1.0
Equipment:	$0.0	$0.0
Equipment Total	$0.0	$0.0

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Project Number: 95320U
Project Title: Prince William Sound System Investigation
Sub-Project: Bioenergetics of Herring and Pollock
Agency: University of Alaska - Fairbanks

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Project Description: Variation in local predation rates on hatchery released fry. This poposal is forfunds to record the size, composition, behavior and duration of foraging aggregations (including mammals, if appropriate) at salmon hatchery release sites. These data will be interpreted in conjunction with results of other projects (that will provide data on prey abundance and distribution) to evaluate the intensity and spatial variation in tetrapod (i.e. bird and mammals) predation on hatchery fry schools, and to test a series of hypotheses explaining that variation.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$6.0	$6.0	$59.2	
Travel	$0.0	$0.0	$0.0	$0.0	$5.2	
Contractual	$0.0	$0.0	$144.2	$144.2	$8.3	
Commodities	$0.0	$0.0	$0.0	$0.0	$6.3	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$150.2	$150.2	$79.0	
General Administration	$0.0	$0.0	$11.0	$11.0	$15.8	
Project Total	$0.0	$0.0	$161.2	$161.2	$94.8	
Full-time Equivalents (FTE)	0.0	0.0	0.1	0.1		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Program Manager	0.0	$0.0	1.0	$6.0
Personnel Total	0.0	$0.0	1.0	$6.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: AK Dept. of Fish & Game

FORM 2A
PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:	$0.0	$0.0
Travel Total	$0.0	$0.0
Contractual:		
RSA with UAF and PWSSC to conduct a study on the variation in local predation rates on hatchery released fry	$0.0	$144.2
Contractual Total	$0.0	$144.2

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Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

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

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1995

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Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

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

Project Description: Variation in local predation rates on hatchery released fry. This poposal is forfunds to record the size, composition, behavior and duration of foraging aggregations (including mammals, if appropriate) at salmon hatchery release sites. These data will be interpreted in conjunction with results of other projects (that will provide data on prey abundance and distribution) to evaluate the intensity and spatial variation in tetrapod (i.e. bird and mammals) predation on hatchery fry schools, and to test a series of hypotheses explaining that variation.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$0.0	$0.0	$0.0	$0.0	$0.0	
Travel	$0.0	$0.0	$0.0	$0.0	$0.0	
Contractual	$0.0	$0.0	$120.2	$120.2	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$0.0	$0.0	$120.2	$120.2	$0.0	
General Administration	$0.0	$0.0	$24.0	$24.0	$0.0	
Project Total	$0.0	$0.0	$144.2	$144.2	$0.0	
Full-time Equivalents (FTE)	0.0	0.0	0.0	0.0		
Dollar amounts are shown in thousands of dollars.						

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1995

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: University of Alaska - Fairbanks

FORM 3A
SUB-PROJECT
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
Travel Total	$0.0	$0.0
Contractual:		
Contract with PWSSC	$0.0	$120.2
Contractual Total	$0.0	$120.2

Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: University of Alaska - Fairbanks

FORM 3B
SUB-PROJECT DETAIL

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

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

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1995

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Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: University of Alaska - Fairbanks

FORM 3B
SUB-PROJECT
DETAIL

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

Project Description: Variation in local predation rates on hatchery released fry. This poposal is forfunds to record the size, composition, behavior and duration of foraging aggregations (including mammals, if appropriate) at salmon hatchery release sites. These data will be interpreted in conjunction with results of other projects (that will provide data on prey abundance and distribution) to evaluate the intensity and spatial variation in tetrapod (i.e. bird and mammals) predation on hatchery fry schools, and to test a series of hypotheses explaining that variation.

Budget Category:	1994 Project No. . . . . Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 95	Comment 94 Report	Comment 95 Interim
Personnel	$0.0	$0.0	$52.7	$52.7	$52.9	$0.0	$0.0
Travel	$0.0	$0.0	$5.2	$5.2	$5.2	$0.0	$0.0
Contractual	$0.0	$0.0	$7.9	$7.9	$8.3	$0.0	$0.0
Commodities	$0.0	$0.0	$6.3	$6.3	$6.3	$0.0	$0.0
Equipment	$0.0	$0.0	$28.1	$28.1	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$0.0	$0.0	$100.2	$100.2	$79.0	$0.0	$0.0
General Administration	$0.0	$0.0	$20.0	$20.0	$15.8	$0.0	$0.0
Project Total	$0.0	$0.0	$120.2	$120.2	$94.8	$0.0	$0.0
Full-time Equivalents (FTE)	0.0	0.0	0.8	0.8			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
D. Scheel	0.0	$0.0	6.0	$39.5
Research Biologist	0.0	$0.0	3.0	$13.2
Personnel Total	0.0	$0.0	9.0	$52.7

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

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Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: Prince William Sound Science Center

FORM 4A
SUB-PROJECT
CONTRACTUAL
DETAIL

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

	Reprt/Intrm	Remaining
Travel:		
2 RT Cordova/Anchorage @$224 + 2 days per diem	$0.0	$0.9
8 RT Cordova/PWS @ $380 +8 days per diem	$0.0	$4.3
Travel Total	$0.0	$5.2
Contractual:		
Long distance phone, fax, e-mail	$0.0	$1.5
Postage, shipping, etc.	$0.0	$1.5
copying, etc	$0.0	$1.5
financial audit	$0.0	$3.4
Contractual Total	$0.0	$7.9

Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

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

Commodities:	Reprt/Intrm	Remaining
Fould weather and safety gear 2 people @ $400	$0.0	$0.8
Office and computer supplies	$0.0	$1.4
Boat fuel 35 days @ $18/day	$0.0	$0.6
Binoculars, field guides 5 people @ $150	$0.0	$0.7
Boat maintenance	$0.0	$0.5
Film/video supplies and processing	$0.0	$1.0
Field supplies (food) 70 person days @ $5	$0.0	$0.4
Camcorder Bag	$0.0	$0.3
2 camcorder batteries	$0.0	$0.2
Camcorder rainshield	$0.0	$0.1
Video tripod	$0.0	$0.3
Commodities Total	$0.0	$6.3
Equipment:		
PC 486 color notebook	$0.0	$5.3
ocean skiff with bridge	$0.0	$20.0
camcorder	$0.0	$2.8
Equipment Total	$0.0	$28.1

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Project Number: 94320 - Y
Project Title: Variation in Local Predation Rates on Hatchery Released Fry
Agency: Prince William Sound Science Center

FORM 4B
SUB-PROJECT
CONTRACTUAL
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project was initially funded in 1994. Startup was delayed pending NEPA compliance which is now complete. Reauthorization is requested for 1995. This project is designed to provide the oil spill communities with methods that will allow for the proper recycling and/or disposal of waste oil and associated toxic waste. This will minimize oil entering the marine environment in Prince William Sound and the Gulf of Alaska thus contributing to a faster recovery of the resources and services injured by the Exxon Valdez oil spill. All communities in the oil spill area would be invited to submit proposals. Each proposal would be scored against criteria designed to select those most likely to succeed. If the program works as expected, it would be recommended for expansion in the following year.

Budget Category:	1994 Project No. 94417 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$49.6	$0.0	$49.6	$49.6	$79.0	The FFY 95 request is for reauthorization of the funds authorized in FFY 94. No new money is being requested.
Travel	$19.9	$0.0	$19.9	$19.9	$19.0	
Contractual	$142.9	$0.0	$142.9	$142.9	$275.0	
Commodities	$2.4	$0.0	$2.4	$2.4	$2.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$214.8	$0.0	$214.8	$214.8	$375.0	
General Administration	$17.4	$0.0	$17.4	$17.4	$24.5	
Project Total	$232.2	$0.0	$232.2	$232.2	$399.5	
Full-time Equivalents (FTE)	0.7	0.0	0.7	0.7	1.0	
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Restoration Specialist	0.0	$0.0	8.0	$49.6
Personnel Total	0.0	$0.0	8.0	$49.6

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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1995

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Project Number: 95417
Project Title: Waste Oil Disposal Facilities
Agency: AK Dept. of Environmental Conservation

FORM 2A PROJECT DETAIL

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

Travel:	Reprt/Intrm	Remaining
Travel to potential grant recipients in the spill affected area (includes an additional visit to each successful recipient) (16 trips - air fare $350/trip + 2 days per diem @ $150/day)	$0.0	$10.0
Travel Anchorage--Juneau (3 trips - air fare $450/trip + 2 days per diem @ $150/day)	$0.0	$2.4
Travel and per diem for proposal review committees (10 trips - air fare $450/trip + 2 days per diem @ $150/day)	$0.0	$7.5
Travel Total	$0.0	$19.9
Contractual:		
Contracts/Grants for demonstration projects (6 projects @ $20,000 per project)	$0.0	$120.0
Freight and cartage of equipment (including office setup)	$0.0	$0.5
Telecommunications, Fax, copier, and courier	$0.0	$4.0
Advertisements re availability of grants	$0.0	$2.0
Printing (including final report), film developing	$0.0	$3.2
Postage	$0.0	$0.4
Contract--accounting firm for independent administration of bills from grant recipients and equipment installers	$0.0	$9.0
Aircraft charter to remote communities (4 trips x $700/trip)	$0.0	$2.8
Risk management (mandatory liability insurance)	$0.0	$1.0
Contractual Total	$0.0	$142.9

Project Number: 95417
Project Title: Waste Oil Disposal Facilities
Agency: AK Dept. of Environmental Conservation

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Commodities:	Reprt/Intrm	Remaining
Consumable office supplies (envelopes, paper, pens, etc.)	$0.0	$1.5
Books, pamphlets, videos, and periodicals	$0.0	$0.6
Film	$0.0	$0.3
Commodities Total	$0.0	$2.4
Equipment:		
Equipment Total	$0.0	$0.0

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1995

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Project Number: 95417
Project Title: Waste Oil Disposal Facilities
Agency: AK Dept. of Environmental Conservation

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project will analyze the environmental effects of implementing the Draft Restoration Plan developed over the past two years, develop alternative Restoration Plans and disclose the effects in an Environmental Impact Statement. Federal law requires an Environmental Impact Statement for major federal actions significantly affecting the quality of the human environment. The FY 94 objective of this project was to identify relevant issues and display the information in an Environmental Impact Statement. In FY 95 this project will be completed with the publication and distribution of the Record of Decision.

Budget Category:	1994 Project No. 94422 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$218.3	$14.8	$0.0	$14.8		Note: This is a closeout project.
Travel	$24.7	$0.0	$0.0	$0.0		
Contractual	$44.0	$2.8	$0.0	$2.8		
Commodities	$5.0	$0.0	$0.0	$0.0		
Equipment	$0.0	$0.0	$0.0	$0.0		
Capital Outlay	$0.0	$0.0	$0.0	$0.0		
Subtotal	$292.0	$17.6	$0.0	$17.6	$0.0	
General Administration	$35.8	$2.4	$0.0	$2.4	$0.0	
Project Total	$327.8	$20.0	$0.0	$20.0	$0.0	
Full-time Equivalents (FTE)	3.3	0.3	0.0	0.3		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm				
Team Leader	2.0	$8.8		
Biologist	2.0	$6.0		
Personnel Total	4.0	$14.8	0.0	$0.0

NEPA Cost:	$0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95422-CLO
Project Title: Restoration Plan Environmental Impact Statement
Agency: Dept. of Agriculture, Forest Service

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm			
	Travel Total	$0.0	$0.0
Contractual:			
Rept			
Intrm	Printing	$2.8	
	Contractual Total	$2.8	$0.0

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1995

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Project Number: 95422-CLO
Project Title: Restoration Plan Environmental Impact Statement
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

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

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

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1995

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Project Number: 95422-CLO
Project Title: Restoration Plan Environmental Impact Statement
Agency: Dept. of Agriculture, Forest Service

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: This project is the primary recovery monitoring effort for Harlequin ducks in Prince William Sound. Major field components include: (1) May-June boat surveys to ascertain an annual abundance index and sex and age composition of the breeding season population in the spill zone compared to eastern PWS; (2) July-August boat surveys to index annual production. Additional components may be linked to follow-up work on food chain toxicology and integration with nearshore ecosystem studies.

Budget Category:	1994 Project No. 94427 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Rept	96 Field	95 Rept
Personnel	$24.4	$15.0	$126.2	$141.2	$188.8	$15.0	$130.0	$58.8
Travel	$2.1	$0.0	$8.1	$8.1	$10.3	$0.0	$8.5	$1.8
Contractual	$3.4	$0.0	$24.5	$24.5	$33.0	$0.0	$26.5	$6.5
Commodities	$5.0	$0.0	$18.2	$18.2	$22.0	$0.0	$21.0	$1.0
Equipment	$3.7	$0.0	$12.0	$12.0	$10.0	$0.0	$10.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$38.6	$15.0	$189.0	$204.0	$264.1	$15.0	$196.0	$68.1
General Administration	$1.8	$2.3	$20.6	$22.9	$30.6	$2.3	$21.3	$9.3
Project Total	$40.4	$17.3	$209.6	$226.9	$294.7	$17.3	$217.3	$77.4
Full-time Equivalents (FTE)	0.	0.2	2.0	2.2	3.4			

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description		Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept	Wildlife Biologist II	2.0	$10.8	0.0	$0.0
Intrm	Wildlife Biologist III Supervisor	0.0	$0.0	1.0	$6.0
	Wildlife Biologist II Project Leader	0.0	$0.0	9.0	$48.6
	Wildlife Biologist I	0.0	$0.0	2.0	$9.6
	Fish & Wildlife Technician III	0.0	$0.0	10.0	$50.0
	Biometrician II	0.0	$0.0	1.0	$6.0
	Program Manager	0.8	$4.2	1.0	$6.0
	Personnel Total	2.8	$15.0	24.0	$126.2

<Includes $15.0 overtime and hazard pay

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95427
Project Title: Harlequin Duck Recovery Monitoring
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm			
Rem	6 RT Anchorage-Cordova @ $250/RT + 12 days per diem		$3.3
	3 RT Anchorage-Whittier (railroad w/ boat) @ $350 + 5 days per diem		$1.8
	3 RT Anchorage-Whittier (railroad w/ vehicle) @ $150 + 5 days per diem		$1.2
	1 RT Anchorage-Washington, DC to examine Harlequin museum specimens @ $600/RT + 3 days per diem		$1.0
	1 RT Anchorage-San Francisco to examine Harlequin museum specimens @ $450/RT + 2 days per diem		$0.8
	Travel Total	$0.0	$8.1
Contractual:			
Rept			
Intrm			
Rem	Warehouse for storage - 9 months @ $500/month		$4.5
	Air charter for surveys - 12 hrs @ $290/hr		$3.5
	Video editing and production - professional services contract		$10.0
	Fuel transportation and storage preparation		$4.0
	Boat and outboard motor repair		$2.5
	Contractual Total	$0.0	$24.5

Project Number: 95427
Project Title: Harlequin Duck Recovery Monitoring
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm			
Rem	Boat fuel - 7,300 gal @ $1.50/gal		$11.0
	Camp food - 120 days @ $35/day		$4.2
	Camp materials and supplies		$2.0
	Misc. office supplies		$1.0
	Commodities Total	$0.0	$18.2
Equipment:			
Rept			
Intrm			
Rem	2 video cameras w/ waterproof cases		$10.0
	2 Field Global Positioning Systems (GPS)		$2.0
	Equipment Total	$0.0	$12.0

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Project Number: 95427
Project Title: Harlequin Duck Recovery Monitoring
Agency: AK Dept. of Fish & Game

FORM 2B
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The purpose of this project is to implement a comprehensive approach to subsistence restoration planning. A planning team will meet with communities to develop project ideas and priorities. The team will also assist with preparation of project proposals and designs. Project descriptions will be prepared for the FFY96 restoration work plan.

Budget Category:	1994 Project No. 94428 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$64.0	$70.2	$0.0	$70.2	$35.2	FFY 96 figures are for report writing only.
Travel	$24.0	$14.1	$2.0	$16.1	$5.0	
Contractual	$1.0	$2.0	$0.0	$2.0	$1.0	
Commodities	$0.5	$1.0	$0.0	$1.0	$0.5	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$89.5	$87.3	$2.0	$89.3	$41.7	
General Administration	$9.6	$10.7	$0.0	$10.7	$5.4	
Project Total	$99.1	$98.0	$2.0	$100.0	$47.1	
Full-time Equivalents (FTE)	0.0	1.3	0.0	1.3	0.0	

Dollar amounts are shown in thousands of dollars.

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

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Agency: AK Dept. of Fish & Game

FORM 2A PROJECT DETAIL

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

Project Description: The purpose of this project is to implement a comprehensive approach to subsistence restoration planning. A planning team will meet with communities to develop project ideas and priorities. The team will also assist with preparation of project proposals and designs. Project descriptions will be prepared for the FFY96 restoration work plan.

Budget Category:	1994 Project No. 94428 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment 94 Report	Comment 95 Interim	Comment 95 Report
Personnel	$51.4	$57.6	$0.0	$57.6	$28.8	$40.6	$17.0	$28.8
Travel	$18.0	$10.1	$0.0	$10.1	$3.0	$6.7	$3.5	$3.0
Contractual	$1.0	$2.0	$0.0	$2.0	$1.0	$2.0	$0.0	$1.0
Commodities	$0.5	$1.0	$0.0	$1.0	$0.5	$1.0	$0.0	$0.5
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Subtotal	$70.9	$70.7	$0.0	$70.7	$33.3	$50.3	$20.5	$33.3
General Administration	$7.8	$8.8	$0.0	$8.8	$4.4	$6.2	$2.6	$4.4
Project Total	$78.7	$79.5	$0.0	$79.5	$37.7	$56.5	$23.1	$37.7
Full-time Equivalents (FTE)		1.1	0.0	1.1				

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Subsistence Resource Specialist II	5.0	$22.6	0.0	$0.0
Subsistence Regional Program Manager	1.0	$7.3	0.0	$0.0
College Intern II	2.0	$3.0	0.0	$0.0
Intrm Subsistence Resource Specialist II	1.0	$4.7	0.0	$0.0
Regional Program Manager	1.0	$7.3	0.0	$0.0
Fish & Wildlife Technician II	2.0	$5.5	0.0	$0.0
Rept Program Manager	1.3	$7.2	0.0	$0.0
Personnel Total	13.3	$57.6	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994
**Jan 1, 1995 - Sep 30, 1995

Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	3 RT Anchorage - Chenega Bay @$0.9 +2 days per diem	$3.2	
	3 RT Cordova - Tatitlek @$0.1 + 2 days per diem	$0.6	
	3 RT Anchorage - Cordova @ $0.2 + 2 days per diem	$0.9	
	3 RT Anchorage - Kodiak City @ $0.19 + 2 days per diem	$0.9	
	3 RT Anchorage - Homer @ $0.1 + 2 days per diem	$0.6	
	3 RT Homer to Port Graham/Nanwalek @ $0.1 + 2 days per diem	$0.6	
Intrm	2 Rt Anchorage/Kodiak @ $ $0.2 + 5 days per diem @ $105/day	$0.9	
	2 RT Anchorage/Chignik Bay @ @ $1.0 + 5 days per diem @ $105/day	$2.5	
	Travel Total	$10.1	$0.0
Contractual:			
Rept	Printing costs	$2.0	$0.0
Intrm			
	Contractual Total	$2.0	$0.0

Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept	Office supplies (paper, toner, pencils, pens)	$1.0	$0.0
Intrm			
	Commodities Total	$1.0	$0.0
Equipment:			
Rept		$0.0	$0.0
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: AK Dept. of Fish & Game

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The purpose of this project is to implement a comprehensive approach to subsistence restoration planning. A planning team will meet with communities to develop project ideas and priorities. The team will also assist with preparation of project proposals and designs. Project descriptions will be prepared for the FFY96 restoration work plan.

Budget Category:	1994 Project No. 94428 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$6.3	$6.3	$0.0	$6.3	$3.2	
Travel	$3.0	$2.0	$1.0	$3.0	$1.0	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$9.3	$8.3	$1.0	$9.3	$4.2	
General Administration	$0.9	$0.9	$0.0	$0.9	$0.5	
Project Total	$10.2	$9.2	$1.0	$10.2	$4.7	
Full-time Equivalents (FTE)		0.1	0.0	0.1		
Dollar amounts are shown in thousands of dollars.						

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Subsistence Specialist	1.0	$6.3	0.0	$0.0
Personnel Total	1.0	$6.3	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: Dept. of Agriculture, Forest Service

FORM 3A SUB-PROJECT DETAIL

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

		Reprt/Intrm	Remaining
Travel:			
Rept	Community travel to review projects		
Intrm	Chenega Bay @ $0.3	$0.3	
	Tatitlek @ $0.1	$0.1	
	Cordova @ $0.2	$0.2	
	Port Graham @ $0.2	$0.2	
	Kodiak @ $0.2	$0.2	
	Chignik Bay @ $0.5	$0.5	
	Per diem	$0.5	
	Community travel to develop project ideas and priorities		
	Chenega Bay @ $0.3		$0.3
	Port Graham @ $0.2		$0.2
	Kodiak @ $0.2		$0.2
	Per diem		$0.3
	Travel Total	$2.0	$1.0
Contractual:			
Rept		$0.0	$0.0
Intrm			
	Contractual Total	$0.0	$0.0

Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: Dept. of Agriculture, Forest Service

FORM 3B
SUB-
PROJECT
DETAIL

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

Project Description: The purpose of this project is to implement a comprehensive approach to subsistence restoration planning. A planning team will meet with communities to develop project ideas and priorities. The team will also assist with preparation of project proposals and designs. Project descriptions will be prepared for the FFY96 restoration work plan.

Budget Category:	1994 Project No. 94428 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel	$6.3	$6.3	$0.0	$6.3	$3.2	
Travel	$3.0	$2.0	$1.0	$3.0	$1.0	
Contractual	$0.0	$0.0	$0.0	$0.0	$0.0	
Commodities	$0.0	$0.0	$0.0	$0.0	$0.0	
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	
Capital Outlay	$0.0	$0.0	$0.0	$0.0	$0.0	
Subtotal	$9.3	$8.3	$1.0	$9.3	$4.2	
General Administration	$0.9	$0.9	$0.0	$0.9	$0.5	
Project Total	$10.2	$9.2	$1.0	$10.2	$4.7	
Full-time Equivalents (FTE)		0.1	0.0	0.1		
	Dollar amounts are shown in thousands of dollars.					

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Subsistence Specialist	1.0	$6.3	0.0	$0.0
Personnel Total	1.0	$6.3	0.0	$0.0

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: Dept. of Interior, National Park Service

FORM 3A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept	Community travel to review projects		
Intrm	Chenega Bay @ $0.3	$0.3	
	Tatitlek @ $0.1	$0.1	
	Cordova @ $0.2	$0.2	
	Port Graham @ $0.2	$0.2	
	Kodiak @ $0.2	$0.2	
	Chignik Bay @ $0.5	$0.5	
	Per diem	$0.5	
	Community travel to develop project ideas and priorities		
	Chenega Bay @ $0.3		$0.3
	Port Graham @ $0.2		$0.2
	Kodiak @ $0.2		$0.2
	Per diem		$0.3
	Travel Total	$2.0	$1.0
Contractual:		$0.0	$0.0
Rept			
Intrm			
	Contractual Total	$0.0	$0.0

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Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: Dept. of Interior, National Park Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

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

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Project Number: 95428
Project Title: Subsistence Restoration Planning and Implementation
Sub-Project:
Agency: Dept. of Interior, National Park Service

FORM 3B
SUB-
PROJECT
DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

Project Description: The existing data bases will be analyzed to firmly establish the relationship between aerial photo channel type interpretations, and the presence of in-stream habitat (spawning and rearing). In addition, the results will be published in a professional fisheries management journal. These analyses and the publication will serve as a basis for any larger scale in-stream habitat surveys that are tied to the Channel Type Classification Study and habitat protection proposals.

Budget Category:	1994 Project No. 94505 Authorized FFY 94	'94 Report/ '95 Interim* FFY 95	Remaining Cost** FFY 95	Total FFY 95	FFY 96	Comment
Personnel		$0.0	$10.4	$10.4		
Travel		$0.0	$0.0	$0.0		
Contractual		$0.0	$4.0	$4.0		
Commodities		$0.0	$1.0	$1.0		
Equipment		$0.0	$0.0	$0.0		
Capital Outlay		$0.0	$0.0	$0.0		
Subtotal	$0.0	$0.0	$15.4	$15.4	$0.0	
General Administration		$0.0	$1.8	$1.8	$0.0	
Project Total	$0.0	$0.0	$17.2	$17.2	$0.0	
Full-time Equivalents (FTE)		0.0	0.2	0.2		

Dollar amounts are shown in thousands of dollars.

Budget Year Proposed Personnel: Position Description	Reprt/Intrm Months	Reprt/Intrm Cost	Remaining Months	Remaining Cost
Rept Intrm Fisheries Biologist GS-11			2.8	$10.4
Personnel Total	0.0	$0.0	2.8	$10.4

NEPA Cost: $0.0

*Oct 1, 1994 - Dec 31, 1994

**Jan 1, 1995 - Sep 30, 1995

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Project Number: 95505B
Project Title: Channel Type Habitat Relationships
SubProject: Data analysis
Agency: USDA Forest Service

FORM 2A SUB-PROJECT DETAIL

1995 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1994 - September 30, 1995

		Reprt/Intrm	Remaining
Travel:			
Rept			
Intrm			
	Travel Total	$0.0	$0.0
Contractual:			
Rept			
Intrm	Professional journal publishing fees		$4.0
	Contractual Total	$0.0	$4.0

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Project Number: 95505B
Project Title: Channel Type Habitat Relationships
SubProject: Data analysis
Agency: USDA Forest Service

FORM 2B
SUB-
PROJECT
DETAIL

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

		Reprt/Intrm	Remaining
Commodities:			
Rept			
Intrm	SAS software and aerial photos		$1.0
	Commodities Total	$0.0	$1.0
Equipment:			
Rept			
Intrm			
	Equipment Total	$0.0	$0.0

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Project Number: 95505B
Project Title: Channel Type Habitat Relationships
SubProject: Data analysis
Agency: USDA Forest Service

FORM 2B
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