Evaluation of Sea Otter Population Structure, Population Condition, and Habitat Use in Prince William Sound and Adjacent Areas; Submitted Under the BAA # 52ABNF800034

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EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

Project Number:	99223
Restoration Category:	Research and Monitoring
Proposer:	Lisa M. Rotterman, Ph.D., Enhydra Research
Lead Trustee Agency:	
Cooperating Agencies:	
Alaska SeaLife Center:	No
Duration:	FY 99, 1st year, 2-year project
Cost FY 99:	$82.1
Cost FY 00:	$70.0
Cost FY 01:	
Cost FY 02:	
Geographic Area:	No Fieldwork
Injured Resource/Service:	Sea Otters and the Nearshore Ecological Community

ABSTRACT

This project will provide information about the population structure, movements, age- and sex-specific survival, habitat use, rehabilitation, distribution and abundance, and carcass persistence of sea otters in PWS and adjacent areas. Findings from this project are crucial to: a) evaluation of past, current and future monitoring and assessment study techniques and design; b) establishment of benchmarks against which to gauge current status relative to recovery; c) formulation of future spill response; d) interpretation of monitoring and damage assessment results and modeling of sea otter recovery; e) evaluation of the impacts of restoration activities on sea otter recovery; and f) elucidation of processes (e.g., immigration or emigration) impacting the course of recovery.

INTRODUCTION

Sea otters were severely impacted by the T/V *Exxon Valdez* oil spill (EVOS) and, based on demographic considerations alone, could not yet have recovered fully from the impacts of the spill. Their current status relative to recovery is unclear. They are described as having not recovered in current EVOS Trustee Council publications. This project would:

1) provide information about sea otter population structure and movement patterns crucial for:
   a. understanding population processes such as immigration and/or emigration affecting population recovery
   b. interpreting data about the impacts of the spill
   c. evaluating the total geographic area over which sea otter populations may have been impacted by the spill
   d. understanding, predicting, and modeling the processes impacting recovery
   e. interpreting survey data and other data aimed at assessing population status relative to recovery
   f. evaluating past, current and future techniques and study design used to monitor population status and being used to identify factors that may be hindering the recovery of sea otters and the nearshore ecological community.

2) result in significant advances in the level and availability of knowledge about trends in sea otter population size and distribution in the years preceding the spill;
3) provide information valuable in assessing the likely impacts of completed and proposed restoration activities and future land use policies (*e.g.*, upland habitat acquisition) on the recovery of a seriously EVOS-injured species and its associated ecological community.
4) provide benchmarks related to the survival of sea otters of different ages and sex against which the current status of the population relative to recovery can be gauged.
5) provide information necessary for formulating future response policy.
6) result in significant advances in the level and availability of knowledge concerning persistent impacts of the EVOS on the survival of adult sea otters.
7) result in significant advances in the level and availability of knowledge about factors related to the survival and reproduction of sea otters released from post-EVOS treatment centers, and hence, provide information crucial to the development of future oil spill response strategy along the west coast of North America.
8) provide key and unique information regarding the distribution, abundance, and behavior of sea otters and other marine mammals within the spill zone immediately (in the days and hours preceding the arrival of oil in a given area), as oil advanced on their habitat, and over time following oiling. This information is the best available for gauging the number of individuals of sea otters, and perhaps some other marine mammal species, exposed to large amounts of fresh crude oil in Prince William Sound. As such, it provides information useful: a) to understanding persistent lethal and sublethal impacts of the spill; b) for understanding post-spill behavior; c) for identifying areas that served as refuges from the oil; d) for providing information useful in formulating future spill response strategy; and e), in the case of sea otters, as benchmarks against which current status of the population relative to total recovery can be gauged.

9) provide an minimum evaluation the number of sea otters exposed to fresh slicks of crude oil and, hence a crude minimum evaluation of sea otter short-term mortality in Prince William Sound that is independent of all previous estimates.
10) result in a greatly improved and more complete understanding of the spill's impacts on sea otters and the factors impacting recovery.

Thus, this project will produce information crucial to understanding the process of recovery of the nearshore ecological community. to evaluating alternative response and restoration strategies and to evaluating monitoring and damage assessment study methodology.

The investigators emphasize that this project is not a project in which finished reports, based on Trustee-funded research, need to be transformed into papers suitable for publication in the peer review literature. Only one of the eight components of this project (the proposed product "Movements of weanling and adult female sea otters in Prince William Sound, Alaska, after the T/V Exxon Valdez oil spill" is of that nature.

Rather, the investigators propose to:

a) Undertake new and extensive data preparation and summarization and statistical analyses of pre- and post-spill data on sea otters and other marine mammals from studies conducted between 1984 and early 1992.
b) Integrate extensive, unique, and unpublished pre-spill baseline data based on year-round field studies over many years with year-round post-spill data;
c) Prepare papers for publication in the primary scientific literature, making the information available to all interested persons.

New and previously unexplored scientific issues will be examined. In most cases, the data to be analyzed are the only data of their kind available for sea otters in the spill region. In all cases they represent the best and most extensive data on the topic available for sea otters in the EVOS area, and, in many cases, there are no comparable data available on sea otters.

Culmination of the project will be the preparation of manuscripts and the publication in the primary scientific literature of 8 papers (5 in year 1 and 3 in year 2), containing almost entirely new, and all previously unpublished, data and findings.

Pre-spill and post-spill data are from the investigators' studies between May 1984 and Nov. 30, 1991 in both Eastern Prince William Sound (EPWS) and western Prince William Sound (WPWS).

A. Relevant Background

No significant closeout funding was provided between 1993-1995 for any of the investigators spill studies as it was for all other comparable studies and only 3.5 months of salary was provided in 1992 (see below). Because of this, funding is now being requested to enable the necessary effort to ensure that unique and valuable data are developed and the relevant findings made available through the peer-reviewed primary scientific literature.

Dr. C. Monnett and Dr. L. Rotterman, who will undertake this project, began studies of sea otter development, reproduction, survival, population structure, genetics, behavior, growth, body condition, and movements in 1984. They pioneered large-scale studies, including radio-telemetry

studies and growth studies, of sea otter pups and weanlings, conducting studies in both eastern and western PWS. In 1987, they initiated a comprehensive study of adult female reproduction, survival, body condition and movements. Working with Dr. D. Siniff, Dr. Monnett and Dr. Rotterman initiated studies in 1984 designed specifically to develop and test indices of individual and population condition in sea otters (*e.g.*, pup growth studies, which had not previously been undertaken anywhere). When the spill occurred, they were halfway through a study of 59 radio-instrumented sea otter females.

Early in the morning on the day of the spill, the proposers initiated multi-species marine mammal fixed-wing aerial surveys to document the distribution and abundance of all marine mammals in areas that might be impacted by the flow of oil from the tanker. These surveys were repeated in areas as the oil progressed, and the behavior of marine mammals to the oil as it invaded their habitat was observed. With assistance from other researchers, such as Dr. R. Garrott, these surveys were repeated many times between the day of the spill and January 1990. They provide the best information available on the number of sea otters and other marine mammals exposed to oil within Prince William Sound, the movements of marine mammals relative to the oil, and the locations of habitats providing refuge from the oil. No funding was ever provided for data analyses, report writing, or manuscript preparation related to this study. A very preliminary summary of some of the aerial survey data from this study was made in the fall of 1989 in the midst of intensive, year-round and daily field activity.

The proposers were the Principal Investigators on key sea otter damage assessment studies. Between 1989 and Nov. 30, 1991, they conducted year-round intensive field studies, including studies of: 1) female reproduction, health, and survival (PI: C.M.); 2) post-weaning survival (PI: L.M.R.); 3) movement patterns (PI: C.M.)M.); 4) determination of the fate of sea otters released from EVOS treatment centers (PI: C.M.); 5) blood chemistry and hematology of adult females and weanlings (PI: L.M.R.); and 6) pre- and post-spill aerial (and to a lesser extent, boat) marine mammal surveys in Prince William Sound (using funding from the Mineral's Management Service) (PI:C.M.). They collected over a hundred samples for clinical blood studies, hydrocarbon analyses and painstakingly recovered carcasses for necropsy and histopathology.

These post-spill studies, which were unprecedented in both scope and content, were highly successful resulting in the acquisition of key information on the spill's impacts on sea otters. Dr. Monnett and Dr. Rotterman captured hundreds of sea otters, radio-instrumented 100 adult females and 64 pups, monitored 45 radio-instrumented otters from the treatment centers.

A key finding from the post-spill studies of Monnett and Rotterman was that the post-weaning survival of sea otters born into the spill area more than a year after the spill was very poor, and was significantly lower than their concurrent counterparts in the unoiled eastern Sound. This finding remains, to date, the most definitive evidence of persistent damage to sea otters from EVOS (see below for further discussion).

Additionally, they demonstrated that female reproductive and survival rates were normal in the spill region in 1990 and 1991, but that adult females in the spill region may have higher rates of liver dysfunction compared with their counterparts in the eastern sound.

Their study of treatment center otters showed that survival and pupping rates of the animals released from the treatment centers was very low and was followed by an increase in mortality in the recipient population.

Their study of movements confirmed that significant interchange was not occurring among oiled (in WPWS) and unoiled (in EPWS) sea otter study populations, a finding crucial to evaluation of all post-spill studies. These movement studies also produced data that provides insight into the recovery process by showing that sea otters from EPWS were not emigrating to the west, and thus, would not be affecting recovery rates.

Despite excellent peer review and peer review recommendations for continuing and extending our studies, all funding for these studies, including all professional and technician salaries, ended without notice on Nov. 30, 1991, when invoices for payment were returned. After several months, and the loss of experienced support staff, 3.5 months of salary were provided to cover:

1) preparation of 5 draft and final reports summarizing over two and a half years of continuous, year-round field work; and
2) all activities necessary to end the study (e.g., inventory and clearing of warehouses and offices, relocation of staff, etc.).

The 3.5 months of salary was unfortunately insufficient to permit full analysis of all post-spill data, to permit analyses or integration of pre-spill data, to permit library work, and, thus, to develop manuscripts for publication.

Despite the short time frame allotted for report preparation, the proposers reported the basic results, addressing all contracted objectives from these studies, in final unpublished reports in 1992. However, the stated objectives of the post-spill damage assessment studies were very simple, e.g., to determine whether post-weaning survival in oiled versus non-oiled areas did, or did not, differ.

The aforementioned reports, while produced very quickly and without significant technical staff, were accepted by the contracting agency as final reports with only minor modification being requested and made. However, these reports were not finalized by the contracting agency until May 1995. No content modifications were requested of the investigators between the submission of the final version of reports in 1992 and the agency certification of documents as "Final Reports" in 1995.

The population studies were highly praised by key sea otter peer reviewers advising the Chief Scientist. One investigator wrote something to the extent that before the successful completion of these studies, no one would have thought them possible.

B. Work Undertaken With FY 1997 Funding

In August of 1996, funding was approved by the Trustee Council to permit one of the investigators to spend 1.5 months on each of 4 papers to undertake analyses and writing necessary, and to consult with an expert marine mammal biostatistician and population modeler (L. Eberhardt), to produce 4 (of 8 originally proposed) papers.

A contract to Dr. L. M. Rotterman for $40,200 for this project was approved and activated on February 1, 1997. The investigators have: 1) submitted a manuscript for publication entitled "Length-mass relationships and total body length in sea otters in Prince William Sound before and after the T/V Exxon Valdez oil spill" to the journal Marine Mammal Science following submission in August 1997 of the manuscript to the NMFS for Trustee review and revision; 2) completed a manuscript entitled "Health, development, and survival of sea otter pups and weanlings", formatted

for publication in the Journal of Mammalogy (referred to hereafter as the "pup/weanling paper; (this paper should be under review by the Trustee Council shortly after submission of this proposal; 3) completed all data analyses, literature review and draft writing of the paper "Survival and reproduction of female sea otters in Prince William Sound, AK after the T/V *Exxon Valdez* oil spill, a paper targeted for Marine Mammal Science (submission to the contracting agency is expected in the month of May 1988); and 4) begun data preparation and summary for the final product, the culmination of which will be a paper entitled: "Age-specific reproduction of female sea otters in Prince William Sound, AK. In development of this last paper, the authors expect to work with L. Eberhardt, as proposed. Completion of this paper is expected before the end of summer.

Extensive new data and analyses are presented in the pup/weanling paper and the length/mass papers referred to above. Actual time devoted to completion was well in excess of that for which funding was requested or provided, as anticipated both by us and by peer reviewers.

For example, in the pup/weanling paper, data from multiple independent pre- and post-spill studies of hundreds of radio-instrumented females and their pups, of radio-instrumented pups and weanlings, and of tagged pups are analyzed and integrated. Data on birth and weaning timing, body condition, growth rates, health, dependency period, and survival are all presented. In the corresponding report, the only objective was to determine whether the survival of weanlings in the eastern sound differed from that observed in the western sound.

A brief summary of important new data and findings resulting from these efforts, which involved: extensive new data preparation, summarization and analysis; integration of pre- and post-spill data bases; integration of data from independent post-spill studies; literature review; and manuscript preparation, are given briefly below:

In the paper on length-mass relationships and total body length in sea otters, we:

1) documented that the mean mass, adjusted for total body length, of male and female sea otters inhabiting oil-affected regions of Prince William Sound after the T/V *Exxon Valdez* oil spill was significantly less than that of individuals captured in the same or adjacent habitat in western Prince William Sound approximately a decade earlier, and than that of individuals inhabiting unoiled habitat in eastern Prince William Sound between 1984-1990;
2) documented that pre-spill, mean adjusted body mass of females in WPWS was significantly greater than in EPWS;
3) documented that, contrary to published predictions of other authors, the body condition of sea otters in EPWS did not change over the 7 years of our study despite dramatic changes in distribution and abundance, and despite sea otter densities that were the highest ever reported;
4) reviewed, and summarized all pre- and post-spill evidence from other studies, including prey studies, oil contamination studies, and sea otters foraging studies, relevant to interpreting data on potential factors impacting body condition and total body length in sea otters in PWS;
5) concluded that evidence strongly suggests that relatively lower post-spill body mass resulted from one or more EVOS-related factors including damage to prey, prey and habitat contamination, harm to individual health, and disturbance;
6) showed that there was no evidence to suggest that sea otter population condition was poor in WPWS just before the spill for any reason, including, but not limited to, prey availability;
7) documented that both pre- versus post-spill body condition and TBL in mature females, and sea otter foraging studies, indicate adequate and improving prey resources in WPWS between the late 1970s and the spill;

8) documented that the mean TBL of mature females captured pre-spill in WPWS was significantly less than that of pre- and post-spill EPWS and post-spill WPWS females;
9) concluded that body condition and TBL are informative indices of current (at time of sampling) and past population condition in sea otters, respectively.

The paper on length-mass and total body length of sea otters was submitted to the Trustees for review in August of 1997. Trustee peer review was quite favorable (Appendix I) and only minor modifications were required prior to journal submission. The authors received trustee peer review comments in December 1997. Results from this work were presented in poster form at the 1998 Trustee Restoration meeting in Anchorage in January 1998 (this poster was mysteriously removed from the room by unknown persons). The revised manuscript was submitted to the journal Marine Mammal Science in January 1998 and is currently under review.

Payment for the length-mass and body length paper (the first payment to be received for this project) was received in mid-March 1998, which allowed the investigators to make computer-related purchases needed to complete the paper on pups and weanlings, and on post-EVOS female reproduction and survival.

The purpose of the pup/weanling paper was to compare and to discuss measures of, and factors related to, the survival, development, and health of young sea otters through the period of dependency and after permanent separation from their mothers, and in so doing, to gain information necessary to determine whether there were persistent impacts of the EVOS on the local populations of sea otters. The individuals studied were born in Prince William Sound, on average, more than a year after the T/V *Exxon Valdez* discharged oil into the sound and were not conceived when the spill occurred.

As noted above, our pup/weanling product differs greatly from the report on the same topic, which was focused solely on the issue of whether survival differed between concurrently studied cohorts in EPWS versus WPWS.

As part of this product, we prepared, summarized, integrated and analyzed relevant data from all of our previous work on the pups of instrumented females, radio-instrumented pups and weanlings, and tagged (but not instrumented) pups, dating back to 1984.

Because we had data from a number of years prior to the spill, we were able to examine the range of variability observed in factors of interest over time and to evaluate data on sea otters in the oil spill zone in that context.

Findings presented in the paper confirm and strengthen the result presented in the final report (prepared in 1992) that post-weaning mortality was significantly and unusually low, compared to both pre-spill and post-spill studies. Proportions of individuals surviving after weaning in WPWS after EVOS were significantly lower in 1990 than in each of 3 separate studies in EPWS, one conducted concurrently and 2 conducted before EVOS.

Data on the survival of pups and weanlings were integrated in this paper and show that very few of the pups born in 1990 could have survived to ever contribute to population recovery as breeders.

The existence of multiple independent data sets made it possible to undertake multiple and independent analyses aimed at evaluating a given issue, such as birth timing, and strengthened interpretation over that possible given a more limited approach, such as that based solely on comparison of oiled versus unoiled concurrent peers.

Although survival of the 1990 WPWS cohort was normal in the spill zone while maternal care was provided, there are multiple forms of evidence that indicated they were not as healthy as their EPWS counterparts during the pup period and may have been compromised at the time of weaning. Evidence indicates that, after the EVOS, the growth rates of sea otter pups in WPWS were negatively impacted and dependency periods lengthened. Pups captured in WPWS during 1990 had less mass and shorter total body length than pups caught in EPWS, but body condition (i.e., weight corrected for length) was similar.

Data in this paper show that significant differences in timing of births and weanings exist between EPWS and WPWS.

When all forms of evidence from this study are considered in concert with evidence from the length- mass paper, and with findings from other investigators regarding the persistence and distribution of oil in the environment and in sea otter prey in the period between 1989 and 1991, a pattern emerges that suggests that multiple oil-related factors likely contributed to the extremely high post-weaning mortality that was documented.

Our confidence in our interpretation of these findings is strengthened by the fact that the results obtained using multiple and independent samples and different analytical approaches were generally consistent.

The paper on female reproduction and survival following the spill provides evidence indicating that, in 1990 and 1991, the survival and reproduction of females in the EVOS area was not abnormally low, but that survival in EPWS declined substantially after the release of treatment center otters into EPWS.

C. Relationship to other projects

This project is relevant to the Nearshore Vertebrate project which seeks to monitor the recovery of sea otters and to determine factors that may be limiting recovery. It provides information on oil spill damage and benchmarks that are necessary for achieving an understanding of sea otter recovery and gauging population status relative to recovery. It provides information on population status and the movements of individuals critical to evaluating the design of past, present and future studies aimed at elucidating factors impacts recovery and to monitoring recovery. It provides information directly relevant to evaluating monitoring methodology and evaluating past, current and future evidence regarding post-spill population status.

The data on aerial surveys post-spill and in Orca Inlet are directly relevant to the interpretation of previously funded Trustee activities. Thus, these data are relevant to evaluation of assumptions previously made about population trends in PWS in the years preceding the spill, to evaluating potential exposure of resident otters, etc.

NEED FOR THE PROJECT

A. Statement of Problem

Sea otters were one of the species most heavily impacted by the Exxon Valdez oil spill. Their current status is unclear. Recent Trustee Council documents list sea otters as "not recovered"

This project will result in extensive new analyses, integration, and publication, of pre- and post-spill data on sea otters directly needed to:

* evaluate monitoring methodology and interpretation of data regarding post-spill population status
* design studies aimed at elucidating factors impacting recovery sea otters and the nearshore ecosystem;
* provide information regarding population structure necessary and critical to the understanding of population processes impacting recovery (e.g., immigration or emigration), evaluating study design, and modeling and understanding the likely course of recovery of sea otters affected by the oil spill;
* provide possible the best information available on the number of sea otters and other marine mammals directly exposed to crude oil from the EVOS, information that is valuable in understanding observed persistent impacts;
* provide information about the behavior of sea otters, harbor seals, sea lions, and other marine mammals as oil invaded their habitat, and on areas that acted as refuges, information that is valuable in formulating future response activities;
* provide information on immediate pre-oiling abundance and distribution of sea otters, harbor seals, and sea lions that can act as benchmarks against which to gauge recovery;
* provide information regarding changes in distribution, abundance, and oiling of sea otters and other marine mammals in the months following the spill, data that valuable for providing an estimate of mortality independent of those provided previously;
* evaluate past and formulate future oil spill response policy
* better understand the geographic extent of damage to sea otters from the spill, and hence, better understand the process of recovery

None of the data proposed to be analyzed, integrated and published here from the Principal Investigator's marine mammal studies between 1984 and 1991 are currently available in the primary scientific literature. Lack of funding to permit the investment of time and effort needed to develop existing pre- and post-spill data from the principal investigators' studies on sea otter movements, reproduction and survival of treatment center otters, habitat use, carcasses, and distribution and abundance relative to oiling in Prince William Sound, AK and adjacent regions has greatly constrained the ability of interested scientists, spill residents, and others to achieve a full understanding of the spill's impacts on sea otters and on the ecosystems in which they play a vital part. It has hampered the interpretation of related findings from other spill-related studies. It has hampered development of meaningful recovery models for sea otters, and resulted in some sea otter-related restoration activities proceeding without important benchmarks against which to gauge current population status relative to recovery.

Information about population structure in and near the spill zone is needed to achieve a full understanding of both the geographic area over which sea otter populations or subpopulations were impacted by the spill, to understand the population processes impacting recovery, to interpret data on distribution and abundance over time, to formulate meaningful population models of recovery, and to evaluate the design of assessment and monitoring studies.

Survey data to be made available through this project can provide the best information available about the number of sea otters and other marine mammals exposed to the crude oil plumes that coursed through Prince William Sound in 1989. They also can provide information about the

behavior of animals as oil invaded their habitat and about the locations of refuges from oiling. They provide immediate pre-oiling benchmarks for key areas within the sound against which to gauge current population status relative to recovery.

Information available in a 6-year pre-spill database is critical for the evaluation and interpretation of data on the number and ages of sea otter carcasses found during beachwalks. These beachwalk data have previously been interpreted as indicating an unusually high adult mortality in the spill zone in the years following the spill, and the data proposed to be developed here are critical in evaluation of that claim. Lack of funding to develop a 6-year pre-spill database has, thus, hampered understanding of current population status.

Information about factors affecting sea otters treated and released from post-EVOS treatment centers is critical to the formulation of future oil spill response policy and to evaluating the full extent of damage to sea otters from the Exxon Valdez oil spill.

Information about sea otter habitat use will aid evaluation of the potential impacts of future marine and upland habitat use on the recovery of a seriously EVOS-injured resource. Evaluation of the use of lagoons and other "unusual" habitats by sea otters will provide insight into the restoration benefits of Trustee-funded upland habitat acquisition on nearshore marine ecological communities.

This project will aid restoration by providing detailed data on EVOS damage to sea otters, without which restoration planning is hobbled. It will also aid restoration by providing benchmarks useful for assessing population status relative to recovery.

As noted in the background section, funding has never been provided to permit more than the most basic analyses of the relevant post-spill data necessary to address simple litigation-driven objectives.

Key peer reviewers have consistently recommended that these investigators be provided support to enable them to fully develop their findings and to make them available to the general scientific community via publication in the primary literature. In 1991, for example, the key sea otter peer reviewer wrote "A complete analysis of the data from instrumented otters in Prince William Sound would certainly be a worthy objective and hopefully the Fish and Wildlife Service will be able to see that funding is available so that a complete analysis is carried out" (D. Siniff in a letter to C. Gorbics, Nov. 14, 1991).

Funds have also not previously been provided to permit the Principal Investigators to undertake the considerable effort to integrate the 1984-1989 (pre-spill) baseline data on the topics proposed here with post-spill data. The grounding of the T/V Exxon Valdez on March 24, 1989 interrupted the pre-spill study and funds were never provided to develop or to publish results of studies initiated in 1987.

Thus, funding is needed to permit the Principal Investigators the time needed to undertake the considerable effort required to finish analyses, integration, and writing required to ensure that the full value of the data and findings from this considerable and unique body of work is realized and available to the public and scientific communities. Peer reviewers to Trustee Council staff have repeatedly recommended that such funding be made available. This proposal seeks a relatively small amount of funding to undertake extensive data preparation, data analyses, manuscript preparation and publication. However, the investigators emphasized that this project has a large data preparation and analysis component and goes far beyond the process needed to convert a

report into a publishable paper. Thus, funding requested is more reflective of the bare minimum time that will be spent than in the first proposal.

B. Rationale/Link to Restoration

As noted throughout this proposal, information to be published as a result of the proposed work will provide benchmarks against which population status relative to recovery can be gauged. They will provide information valuable to planning future response efforts. They also provide baseline data that can serve as benchmarks of normalcy against which to evaluate whether further damage is occurring.

Due to lack of support to enable further data summarization and analyses, including the integration of a massive amount of baseline data from studies conducted prior to the spill, the scientific community and the public have not been able to fully evaluate and to understand the impacts of the spill on sea otters. Some publications have reported that there essentially was little relevant baseline on sea otters, and thus, that differences observed were difficult to interpret. However, many years of comparable data exist on the key pieces of information necessary to evaluate damage and to monitor recovery.

Without reliable and detailed data on the population structure it is not possible to evaluate various alternative interpretations of data collected to assess damage and to monitor recovery, to form conclusions about recovery status, or to understand mechanisms impacting recovery.

C. Location

This project will be undertaken from the Principal Investigator's offices in Homer, AK and in Kailua, HI. The project's benefits will be realized globally, as information will be published in the primary literature and, thus, will be available to all interested persons.

COMMUNITY INVOLVEMENT AND TRADITIONAL KNOWLEDGE

The Principal Investigators strongly support greater involvement of spill-area residents in Trustee Council restoration activities. The Principal Investigators have been residents of the spill area since 1984. This project involves the development, integration and publication of data from studies already conducted. No new fieldwork is proposed here and no technician aid is requested. Since the primary objectives of the proposal are to develop, integrate and publish results from the Principal Investigators' long-term studies, they will undertake all data analyses and writing required for project completion. Thus, it is unclear how, or if, additional spill area residents, other than the Principal Investigators, could be involved in implementation. However, the Principal Investigators would be willing to coordinate with the Spill Area-Wide Coordinator for the Trustee-sponsored Community Involvement Project to enhance communication of research findings from these projects to local communities.

Both before and after the spill, the Principal Investigators have ensured that interested members of the Native community had access to the findings from their research. For example, in the past, the authors have provided summaries of findings from their studies orally at meetings of the Alaska

Sea Otter Commission, and provided copies of research publications to local Native corporations and to the Alaska Sea Otter Commission. Communication of the results from this project could take similar forms, or could involve non-technical oral presentations to community groups or the dissemination of reprints to local libraries. At present, no funds are requested to permit such enhanced communication. If the project is funded and activities such as community visits or reprint dissemination is requested by the spill Area-Wide Coordinator, the budget will need to be adjusted accordingly.

PROJECT DESIGN

A. Objectives

The general objectives of this proposal are to prepare, integrate and summarize data, conduct extensive new analyses, conduct needed literature review and summarization, and produce eight manuscripts for publication containing findings from large, multi-year pre- and post-spill studies of sea otters and post-spill studies of other marine mammals, in Prince William Sound and the Gulf of Alaska in order to:

a) provide critical information about the population structure, movements, age- and sex-specific survival, habitat use, rehabilitation, distribution and abundance, and carcass persistence of sea otters in PWS and adjacent areas;
b) permit evaluation of past, current and future monitoring and assessment study techniques and design and aid in the design and evaluation of future monitoring study design;
c) establish benchmarks against which to gauge the current population status of sea otters relative to recovery ;
d) formulate future spill response and restoration strategies;
e) interpret monitoring and damage assessment results;
f) permit meaningful modeling of sea otter recovery;
g) evaluate impacts of restoration activities on sea otter recovery;
h) elucidate processes (e.g., immigration or emigration) impacting the course of recovery.
i) enhance understanding of the habitat requirements of sea otters
j) enhance understanding of the process of recolonization and population ecology of sea otters, including the relationships between population density and population condition;
k) provide information about sea otter population trends in distribution and abundance at the time of the spill, and thereby, aid in interpretation of post-spill findings;
l) generate benchmarks of sea otter population status relative to recovery.

This project will provide information about the population structure, movements, age- and sex-specific survival, habitat use, rehabilitation, distribution and abundance, and carcass persistence of sea otters in PWS and adjacent areas. Findings from this project are crucial to: a) evaluation of past, current and future monitoring and assessment study techniques and design; b) establishment of benchmarks against which to gauge current status relative to recovery; c) formulation of future spill response; d) interpretation of monitoring and damage assessment results and modeling of sea

otter recovery; e) evaluation of the impacts of restoration activities on sea otter recovery; and f) elucidation of processes (e.g., immigration or emigration) impacting the course of recovery.

The objectives associated with the analyses and other activities associated with each of the 8 papers are described in the section entitled "publications and reports". However, in order to facilitate evaluation of the objectives of the project as a whole, a brief listing of the specific objectives of the analyses to be undertaken and the structure of the papers to be written are given below by paper. The amount of funding requested for each major portion of the project, given as amount of time for which funding is requested, is provided at the end the description of activities related to each paper.

Year 1:

1) "Persistence of beach-cast carcasses of radio-instrumented sea otters in Prince William Sound, AK" objectives:

a) analyze, integrate, and present data from studies conducted in Prince William Sound from the spring of 1984 to the end of Nov. 1991 on the condition and persistence of beach-cast carcasses of radio-instrumented sea otters as a function of age, sex, location, and time of year;
b) to develop and make available data directly relevant to the use of carcass counts obtained from annual beach walks of selected beaches as an indicator of mortality, and, hence, to make available data useful in the design of long-term monitoring of oil spill impacts and recovery following EVOS and future oil spills; and
c) make available data directly needed to evaluate previous interpretations of findings from the aforementioned carcass studies as evidence of persistent elevated mortality in sea otter adults related to the Exxon Valdez oil spill.

Time for which funding is requested: 2.0 months.

2) "Movements of weanling and adult female sea otters in Prince William Sound, Alaska, after the T/V Exxon Valdez oil spill" objectives:

a) summarize movement data crucial to achieving a full understanding of the damages to the affected population(s) and the likely course of recovery of that population;
b) provide information necessary to evaluate the basic design of many of the sea otter damage assessment studies and for guiding other analyses (e.g., to evaluating the assumption that the location of capture is indicative of the general area of residence and that sea otters from groups compared in other studies (e.g., the weanling study) do not live in the same habitat at any time;
c) to evaluate whether there is significant immigration or emigration of sea otters into, or from, the oil spill affected region in general and whether sea otters within the oil spill affected region appear to be preferentially using or avoiding the most heavily oiled areas, and in so doing to provide data necessary to understand and to be able to make predictions about the recovery of sea otters in the oil spill affected areas.

Time for which funding is requested: 1.5 months.

3) "Survival and reproduction of sea otters released from treatment centers after the T/V Exxon Valdez oil spill" objectives:

a) analyze unique data and present findings on the survival and the reproduction of sea otters that were captured in oiled habitat after the Exxon Valdez oil spill, treated at centers established in response to the spill, and released back into unoiled habitat in PWS in the summer of 1989
b) compare the survival and reproduction of the treated animals to similar data on the recipient population collected concurrently, and prior to the spill
c) to examine factors possibly related to survival (e.g., age, condition upon capture, movement after release, center where treated, etc.)
d) to present data and findings critical to the evaluation of the efficacy of sea otter response and rehabilitation strategies
e) to provide information needed to evaluate the total extent of damage done to sea otter populations affected by the EVOS.

Time for which funding is requested: 2.0 months.

4) "Post-weaning movements of male and female sea otters in Prince William Sound, AK" objectives:

a) summarize, analyze and present data on the post-weaning movements of radio-instrumented sea otters studied between 1984 and 1991 in Prince William Sound, Alaska in order to provide information about the population structure of sea otters within the spill zone and adjacent areas
b) determine whether there are sex-specific patterns is post-weaning movements of sea otters, including the distance traveled, and the type of habitat resided in, following weaning
c) provide information directly relevant to understanding the population processes affecting recovery in the spill zone, e.g., to determining whether significant immigration into or emigration from the spill zone occurs that might would impact population recovery within the spill zone
d) provide information necessary for evaluating trends in sea otter distribution and abundance in the oil spill area over time, for understanding population dynamics over the course of recovery, and, also to creating meaningful models of post-EVOS recovery of sea otters
e) provide a measure of the probable source pool for recruitment of sea otters to the oil spill areas
f) provide insight into total geographic area over which sea otters were likely impacted by the spill.

Time for which funding is requested: 2.5 months.

5) "Immediate pre-oiling and repeated post-oiling surveys of marine mammals in Prince William Sound following the T/V Exxon Valdez oil spill" objectives:

a) determine, compare, and publish information on the pre- and post-spill (meaning, in this case, the period after the arrival of oil in an area, rather than the period after the spillage of oil from the tanker) distribution and abundance of marine mammals (sea otters, harbor

seals, Steller sea lions. orcas, and other marine mammals) in areas of Prince William Sound using repetitive surveys conducted between March 24, 1989 and Jan. 1990;

b) summarize, analyze and publish data relevant to assessing and interpreting oil impacts on sea otters, harbor seals, Steller sea lions, orcas, and other marine mammals;

c) make available information about the behavior of sea otters and other marine mammals as crude oil invades their habitat through observations made during aircraft surveys, and in doing so, gain insight that will be useful in the interpretation of carcass data, and evaluation of the potential alternative methods and strategies of response;

d) summarize, analyze, and make available information that is critical to estimating the numbers of sea otters, harbor seals, and sea lions exposed to crude oil in Prince William Sound, and, hence to the interpretation of other data regarding potential EVOS impacts on marine mammals;

e) provide information regarding locations affording refuge from oil for sea otters following the EVOS, and, in so doing, provide information valuable in the formulation of response activities in the event of future oil spills in the sound or other sea otter habitat.

Time for which funding is requested: 2.5 months.

Year 2:

6) Use of lagoons, land, and other "unusual" habitats by sea otters in Prince William Sound, AK" objectives:

a) to analyze data on the locations of hundreds of radio-instrumented sea otters from studies conducted in PWS between 1984 and 1991 to evaluate the importance of lagoons, other habitats surrounded by land, streams, and land to different age and sex classes of sea otters in PWS;

b) provide insight into the impact of various land-uses on sea otters in PWS and elsewhere, and, thus, provide insight into the benefits of habitat acquisition and protection to sea otter recovery;

c) aid in the interpretation and design of studies, including surveys, undertaken to assess sea otter population status relative to recovery;

d) provide information valuable in the formulation of future response and restoration efforts

Time for which funding is requested: 3.0 mo.

7) Orca Inlet surveys objectives:

a) analyze data from aircraft surveys of sea otter abundance and distribution undertaken in EPWS during 1988;

b) provide information regarding trends in population distribution and abundance in PWS in the year preceding the spill;

c) provide insight valuable in the interpretation of other data (*e.g.*, body condition and survival data) in areas of differing densities of PWS;

d) provide insight valuable in the interpretation of survey data;

e) examine data on seasonal movements and patterns in abundance among survey subunits;

f) examine data on haulout use by sea otters;

g) provide information important to the formulation of future restoration and response strategies by pinpointing areas of high concentrations of sea otters in PWS.

Time for which funding is requested: 2.0 mo.

8) Age-specific survival of adult male and females objectives:
   a) develop and publish age-specific survival schedules for both male and female sea otters using data from all of our studies conducted between 1984 and the end of 1991;
   b) produce information about sea otter survival crucial for interpreting current observations about population trends relative to recovery from EVOS;
   c) make available data crucial to modeling the recovery of sea otters from EVOS;
   d) summarize the least biased, most accurate data available on survival parameters for sea otters in PWS.

Time for which funding is requested: 3mo.

B. Methods

The purpose of this project is to conduct extensive new analysis of existing data, integrate data from pre- and post spill studies, and to produce and submit five manuscripts for publication in the primary literature. No new field work or data collection is proposed.

We emphasize that extensive data preparation, data summarization, new analyses, new integration of findings and literature review, etc., will be undertaken and presented in these most of these manuscripts. Some of the data, which will be summarized and analyzed here, were collected during NRDA studies and much of it was not. While directly relevant to interpreting oil spill impacts on, and recovery of, marine mammals and associated ecosystems, most of the findings to be contained within the papers have not been previously summarized in NRDA final reports. Thus, the final products will, in scope and content, go far beyond the objectives and products of previously funded Trustee Council activities and, hence, provide information previously unavailable. As such, this project requires considerably more time for completion beyond the time necessary to make the transition between report and publishable paper.

Where possible, papers will incorporate additional data from studies conducted in Prince William Sound by the investigators during 1984-1989. Much of the data to be analyzed and presented in publishable papers is from both pre-spill and post-spill studies conducted by the authors.

The section on "Publications" summarizes the types of data to be analyzed, integrated and presented in each paper. Background on the basic methods that were employed in the collection of the data to be analyzed are also presented in the "Publications" section.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

None

SCHEDULE

A. Measurable Project Tasks for FY 99 (October 1, 1998-September 30, 1999)

Assuming a starting date of October 1, 1998, the following is the intended schedule for this project in the interval October 1, 1998-Sept. 30, 1999:

October 1, 1998:	Begin data summary, analyses, and literature review needed for first paper
November 30, 1998:	Submit paper "Persistence of beach-cast carcasses..." for review by Chief Scientist
January 30, 1999:	Submit paper "Movements of Weanling and Adult Female Sea Otters...After the EVOS" for review by Chief Scientist
March 15-22:	Prepare talk for Trustee Symposium
March 22-28:	Travel to and attend Trustee Symposium
April 1:	Submit paper "Immediate pre-spill and repeated post-spill surveys of marine mammals...following the T/V Exxon Valdez oil spill" for review by Chief Scientist
June 1999:	Spend 2 days in travel and 5 days in attendance at American Society of Mammalogy Meeting
June 30:	Submit paper "Survival and reproduction of sea otters released from treatment centers after the T/V Exxon Valdez oil spill for review by Chief Scientist
Sept. 30	Submit paper "Post-weaning movements of male and female sea otters in Prince William Sound, AK" for review by Chief Scientist

B. Project Milestones and Endpoints

The project objectives will be met when each successive manuscript is submitted first for review by Trustee Council peer reviewers, and lastly for journal review prior to publication in the primary literature.

C. Completion Date

The project will be completed when the last manuscript is submitted, on, or before, Sept. 30, 1999.

PUBLICATIONS AND REPORTS

Below, information is provided on the types of data, comparisons to be made, and the manuscripts to be developed and submitted for publication in FY 1998 under this proposal.

1) Title: Persistence of beach-cast carcasses of radio-instrumented sea otters in Prince William Sound, AK

Targeted Journal: Marine Mammal Science

When Manuscript will be Submitted: By November 30, 1998

Subject and Relevance to Restoration:

Information obtained about the number and estimated age of sea otters found as beach cast carcasses on selected beaches have been collected over the past 20 years in Prince William Sound and have been used to draw conclusions about the rates of mortality of various age classes of sea otters following the Exxon Valdez oil spill.

The data to be developed and made available through publication in this paper are directly relevant to the interpretation of carcass counts obtained on annual beach walks of selected beaches, and their use as an indicator of mortality.

Data will be presented on the condition and persistence of beach-cast carcasses of radio-instrumented sea otters as a function of age, sex, location, and time of year. Data from studies conducted in Prince William Sound from the spring of 1984 to the end of Nov. 1991 will be analyzed, integrated, and presented.

2) Title: Movements of Weanling and Adult Female Sea Otters in Prince William Sound, Alaska, After the T/V Exxon Valdez Oil Spill.

Targeted Journal: Marine Mammal Science

When Manuscript will be Submitted: By January 30, 1999

Subject and Relevance to Restoration:

In order to provide movement data necessary to address the issues discussed below, we monitored the movements of radio-instrumented weanling and adult female sea otters between October, 1989, and November, 1991. We made observations on individuals inhabiting the area affected by the oil spill in western Prince William Sound (WPWS) and on individuals living in ostensibly unaffected habitat in eastern Prince William Sound (EPWS).

Final analyses of these data (final with respect to the following issues only) will be undertaken, needed literature review undertaken, and a manuscript for publication in the peer reviewed scientific literature will be prepared.

In previous studies it has been well documented (e.g., Garshelis et al. 1984; Monnett 1988) that sea otters in Prince William Sound are capable of moving long distances. Given the great potential mobility of sea otters documented in other studies, movement data are needed to:

- test assumptions about the reliability of capture or single point observation location as a reliable indicator of the region normally inhabited
- test assumptions about the discreteness of compared groups of animals.
- understand and to be able to make predictions about the recovery of sea otters in the oil spill affected areas.
- provide information critical to interpreting information currently being collected about population status relative to recovery and potential factors limiting recovery

- provide information needed to model the recovery of sea otters in EVOS-affected areas

Thus, findings to be presented in the proposed paper will provide information about sea otter movements and population structure critical to the evaluation of past, current, and future techniques and study designs aimed at monitoring the recovery of affected sea otter populations and the associated nearshore ecological community.

Relatedly, in order to interpret data within the oil spill zone. it is necessary to understand the movements of individuals being studied relative to categorization of habitat with regard to oiling.

Movement data are needed to evaluate whether there is significant immigration or emigration of sea otters into, or from, the oil spill affected region in general and whether sea otters within the oil spill affected region appear to be preferentially using or avoiding the most heavily oiled areas. Without such data, it is not possible to meaningfully model or to interpret population recovery.

Data to be reported herein will provide information needed to model recovery of sea otters in affected areas in Prince William Sound by providing information about whether the recovery of the sea otter population in the oil spill affected region of Prince William Sound will likely be a direct function of the rates of survival and reproduction of the sea otters in the affected habitat or whether there is significant influence from emigration or immigration from or to the area.

Findings from this paper will provide information on whether sea otters tend to avoid oiled habitat, and hence, provide information critical to the evaluation of data on distribution and abundance of sea otters over time in certain areas as an indicator of population recovery.

3) Title: Survival and reproduction of sea otters released from treatment centers after the T/V Exxon Valdez oil spill

Targeted Journal: Conservation Biology

When manuscript will be submitted: By June 30, 1999

Subject and Relevance to Restoration:

This paper will present findings on the survival and the reproduction of 45 sea otters that were captured in oiled habitat after the Exxon Valdez oil spill, treated at centers established in response to the spill, and released back into unoiled habitat in PWS in the summer of 1989. Data of the survival and reproduction of these animals will be compared to similar data on the recipient population collected concurrently, and prior to the spill. Factors possibly related to survival (e.g., age, condition upon capture, movement after release, center where treated, etc.) will be examined.

The data to be presented in this paper are the only existing data available for evaluating the long-term fate of sea otters released into their natural habitat following a large-scale oil spill and subsequent rehabilitation effort. Hence, they are critical for the evaluation of the efficacy of the rehabilitation strategy and for the planning of future response policy. They also provide insight into the probable fate of the other sea otters released from the EVOS treatment centers back to the wild and so provide heretofore unconsidered information relevant to assessing the total damage to, and, hence, the full recovery of, sea otter populations from the Exxon Valdez oil spill.

4) Title: Post-weaning movements of male and female sea otters in Prince William Sound, AK

Targeted Journal: Canadian Journal of Zoology

When manuscript will be submitted: By Sept. 30, 1999

Subject and Relevance to Restoration:

Data on the post-weaning movements of radio-instrumented sea otters studied between 1984 and 1991 in Prince William Sound, Alaska, will be examined. The movements of male and female sea otter weanlings will be compared, including the distance traveled, and the type of habitat resided in, following weaning. Data on the movements of mother-pup pairs prior to weaning will also be summarized and compared to post-weaning movement patterns.

Information that will be published in this paper will provide direct information necessary for evaluating trends in sea otter distribution and abundance in the oil spill area over time and for understanding population dynamics over the course of recovery.

For example, it is directly relevant to the interpretation of mother-pup counts obtained to estimate population or area-wide pupping rates. Since available data indicate that weanlings are probably the age class of sea otters most vulnerable to the chronic impacts of the spill, this information can provide guidance to the design of sampling efforts aimed at assessing the impacts of the spill on the nearshore sea otter (and other predator) prey communities.

This paper will also provide information directly relevant to determining population structure, knowledge of which is required before meaningful interpretation can be made of trends in distribution and abundance over time.

It will also provide a measure of the probable source pool for recruitment of sea otters to the oil spill areas. Conversely, it may provide some insight into the probable magnitude of emigrations from the area.

5) Title: Immediate pre-oiling and repeated post-oiling surveys of marine mammals in Prince William Sound following the T/V Exxon Valdez oil spill.

Targeted Journal: Marine Mammal Science

When Manuscript will be Submitted: By April 1, 1999

Subject and Relevance to Restoration:

In this portion of the project, we will summarize, analyze, and publish data from surveys on the distribution, abundance and behavior of marine mammals in Prince William Sound both immediately prior to, immediately after, and for a number of months after, the arrival of oil from the T/V Exxon Valdez. These unique data are relevant to assessing and interpreting oil impacts on sea otters, harbor seals, Steller sea lions, orcas, and other marine mammals.

Objectives:

The objectives of this study are to summarize, analyze and publish data from fixed-wing and, to a much lesser extent, boat, surveys of marine mammals in selected areas of Prince William Sound conducted between the morning of March 24, 1989 through Jan. 5, 1990 in order to:

a) Determine and compare the pre- and post-spill (meaning, in this case, the period after the arrival of oil in an area, rather than the period after the spillage of oil from the tanker) distribution and abundance of sea otters and other marine mammals in areas of Prince William Sound using repetitive surveys;
b) make available information about the behavior of sea otters and other marine mammals as crude oil invaded their habitat through observations made during aircraft surveys, and in doing so, gain insight that will be useful in the interpretation of carcass data and evaluation of carcass data and evaluation of the potential alternative methods and strategies of response.
c) identify areas that served as refuges for sea otters after the EVOS and, thus, provide information useful in formulating future spill response strategy.

6) Title: Orca Inlet Surveys

Targeted Journal: Marine Mammal Science

When the Manuscript will be Submitted: by September 2000

Subject and Relevance to Restoration

This paper present findings from aircraft surveys of sea otter abundance and distribution undertaken by the investigators in EPWS during 1988. Four successive surveys were undertaken. These surveys have been repeatedly cited in discussions and disagreements related to estimates of numbers of sea otters killed due to acute impacts following the EVOS. They provide information regarding trends in population distribution and abundance in the year preceding the spill. However, while the authors prepared a report on these surveys, the relevant report never underwent peer review, and data analysis remained incomplete due to interruption of the authors' research by the EVOS.

In addition to providing information about population trends in PWS prior to the spill, these survey data provide unique insight valuable in the interpretation of other data (*e.g.*, body condition and survival data) because the densities observed in parts of PWS were among the highest ever reported. While these areas are in EPWS, previous investigators documented seasonal movements of adult males from the Green Island area to these locations.

The analyses to be undertaken will also provide insight valuable in the interpretation of survey data. Data on seasonal movements and patterns in abundance among survey subunits will be examined. Data on haulout use by sea otters will also examined. Thus, these data are important in the formulation of future restoration and response strategies by pinpointing areas of high concentrations of sea otters in PWS.

7) Title: Use of lagoons, land, and other "unusual" habitats by sea otters in Prince William Sound, AK

Targeted Journal: Marine Mammal Science

When the Manuscript will be Submitted: by March 2000

Subject and Relevance to Restoration

Data on the locations of hundreds of radio-instrumented sea otters from studies conducted in PWS between 1984 and 1991 will be analyzed and discussed to evaluate the importance of lagoons, other habitats surrounded by land, streams, and land to different age and sex classes of sea otters in PWS.

Such data will:

a) provide insight into the impact of various land-uses on sea otters in PWS and elsewhere, and, thus, provide insight into the benefits of habitat acquisition and protection to sea otter recovery;
b) aid in the interpretation and design of surveys undertaken to assess sea otter population status relative to recovery;
c) provide information valuable in the formulation of future response and restoration efforts

8) Title: Age-specific survival of male and female sea otters in Prince William Sound, AK

Targeted Journal: Journal of Wildlife Management

When manuscript will be submitted: By September 2000.

Subject and Relevance to Restoration:

We will develop and publish age-specific survival schedules for both male and female sea otters using data from all of our studies conducted between 1984 and the end of 1991. Observations on over 300 individuals studied in Prince William Sound will be utilized in the analyses.

The analyses to be undertaken will produce information about sea otter survival crucial for interpreting current observations about population trends relative to recovery from EVOS. The analyses and manuscript development will also make available data crucial to modeling the recovery of sea otters from EVOS.

This paper will summarize the least biased, most accurate data available on survival parameters for sea otters in PWS.

PROFESSIONAL CONFERENCES

Funding for registration and travel expenses needed to permit the Principal Investigator to present a paper at, and to attend, one professional conference (the American Society of Mammalogy Annual Meeting) in FY 1999 is requested. No previous conference funding has ever been provided to the Principal Investigator to present findings from the extensive and long-term EVOS-related studies of these investigators.

No presentation of the findings from the long-term studies of these investigators has been made to the American Society of Mammalogy, despite the obvious relevance of this research to its members.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project is directly relevant to the Nearshore Vertebrate Ecosystem Project. Publication of these papers will provide information crucial for understanding current population status. It will provide benchmarks for population status in key areas.

This project will provide information key to evaluation and interpretation of certain monitoring techniques and study designs in the Nearshore Ecosystem Project.

This project is proposed as a two year project. A two-year commitment by the Trustee Council will permit the investigators to invest in data preparation in year one to make work in year two more efficient.

PROPOSED PRINCIPAL INVESTIGATOR

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Anchorage, AK 99503
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PRIMARY COLLABORATOR

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Fax: 808-261-0271

PRINCIPAL INVESTIGATOR

Dr. Lisa M. Rotterman will be Principal Investigator on this project and Dr. Charles Monnett will be the Primary Collaborator. In addition to having extensive research experience in the spill region, the Principal Investigator is a spill area resident and has resided in the spill region since 1984.

Working in full collaboration, Dr. Monnett and Dr. Rotterman have conducted original research on sea otter population ecology, behavior, development, and genetics in Alaska since 1984. Their sea otter research has included, but not been limited to, research on sex-, age-, and locality-specific survival rates and causes; reproductive patterns and rates; movement patterns; morphology; body condition; and growth. They have also conducted studies on sea otter population structure and molecular and population genetics. Their sea otter studies have been multi-year, year-round studies in which hundreds of radio-instrumented individuals are studied intensively. They have developed indices by which to assess and compare sea otter population status generally, and under different resource regimes, specifically.

Dr. Monnett and Dr. Rotterman pioneered studies on sea otter pups and weanlings. At the time of the spill, and until their studies were taken over by government researchers in 1992, they were the only scientists in the world to have conducted large-scale growth and telemetry studies on these age classes. This work permitted the post-spill studies on weanling survival, which produced the most definitive evidence of chronic damage to sea otter populations from the spill to date.

Dr. Monnett and Dr. Rotterman hold the best, most comparable, and in many cases the only baseline data available on the growth, reproduction, body condition, survival and movements of sea otter females, pups and weanlings in Prince William Sound.

As discussed more below, Dr. Monnett and Dr. Rotterman collaboratively conducted much of the post-spill field research on sea otters until 1992. They conducted pre- and post oiling marine mammal surveys in WPWS in 1989, including surveys initiated on the day of the spill. They captured, instrumented and monitored approximately a hundred and sixty sea otters in order to evaluate the impacts of the spill on adult female and weanling survival, health, and movements, and on female reproduction. They collected hundreds of samples for toxicology, pathology, blood chemistry and other studies. They also successfully undertook studies to evaluate the efficacy of the post-spill sea otter rehabilitation program by monitoring the post-release fate of sea otters from the treatment centers.

Dr. Monnett and Dr. Rotterman have written over 30 reports and publications based on their sea otter research.

Individual information about the qualifications of the two researchers are provided below.

Dr. Rotterman was the Principal Investigator on two major facets of the post-spill sea otter studies: 1) studies aimed at determining the impact of the spill on weanling survival; and 2) the impacts of the spill on the health of adult female and weanling sea otters as assessed through evaluation of blood chemistry and hematology. She has a Ph.D. and a M.S. from the Department of Ecology and Behavioral Biology at the University of Minnesota and a B.S. from the University of Maryland in the field of Conservation and Resource Development, with specialty in Fish and Wildlife. The specialties of her Ph. D. program were population and community ecology, evolution, and

behavior. She has a second area of Ph.D.-level expertise in the fields of population, quantitative, and molecular genetics and earned a minor in Genetics as part of her Ph.D. program.

The topic of her Ph.D. dissertation was the impacts of population fragmentation and reduction on genetic variability and structure within and among populations of sea otters, and the implications of current genetic status to long-term viability. The field portions of her doctoral research were undertaken in Alaska, particularly in Prince William Sound. She was twice appointed as a Guest Researcher in the Laboratory of Viral Carcinogenesis in the Genetics Section at the National Cancer Institute, National Institutes of Health where the laboratory portions of her doctoral research was undertaken.

In addition to her research on sea otter ecology and genetics, she has many years of experience conducting research in the fields of avian ecology and non-human primate toxicology and infant development. She has additional research experience on other marine mammals, and caribou.

OTHER KEY PERSONNEL

Dr. Monnett will be the Primary Collaborator on this project. Dr. Monnett was the Principal Investigator on several key portions of the post-spill sea otter studies: 1) studies aimed at evaluating the impact of the spill on female health, reproduction and survival; 2) studies of the movement patterns of sea otters after the spill; 3) studies aimed at determining the efficacy of the sea otter rehabilitation program; and 4) pre- and post-spill aerial (and to a lesser extent, boat) marine mammal surveys (sea otters, harbor seals, sea lions, and other marine mammals) in oiled and adjacent areas of PWS, which he initiated on the morning of the spill.

Dr. Monnett has a Ph.D. from the Department of Ecology and Behavioral Biology at the University of Minnesota and a B.S. from the University of Washington in Zoology. He also has training in the veterinary sciences and is a certified veterinary technologist. He holds a private pilot's license and is certified as a commercial diver.

The topic of Dr. Monnett's Ph.D. dissertation was "Patterns of Movement, postnatal development and mortality of sea otters in Alaska" in which studies of sea otter pups and weanlings were pioneered.

In addition to his research on sea otters, he has many years of experience conducting research in the fields of avian ecology and non-human primate toxicology and infant development. He also has additional research experience on other marine mammals.

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel		$54.6
Travel		$2.8
Contractual		$14.0
Commodities		$0.0
Equipment		$0.0
Subtotal	$0.0	$71.4
Indirect		$10.71
Project Total	$0.0	$82.1
Full-time Equivalents (FTE)		10.5
	Dollar amounts are shown in thousands of dollars.	
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
$70.0				

Comments:

Indirect rate of 15% and includes cost of office (telephone, fax, rent, email, electricity, xeroxing, postage and supplies), use and maintenance of computer and other office equipment,

"Consultant for quantitative methods" would provide assistance with statistical analyses, population demographic analyses and database management. Costs of consultation fee, travel and perdiem are included.

FY 99

Prepared:

Project Number: 99223
Project Title: SEA OTTER POPULATION BIOLOGY & HABITAT USE
Name: LISA M. ROTTERMAN, PH.D.

FORM 4A
Non-Trustee
SUMMARY

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FY 1999
LISA ROTTERMAN	PRINCIPLE INVESTIGATOR		10.5	5.2		54.6
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		10.5	5.2	0.0	
					Personnel Total	$54.6

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 1999
TRAVEL TO ANNUAL MEETING HNL-ANC	0.8	1	7	0.1	1.5
TRAVEL TO ANN. MEETING AMER. SOC. MAMMALOGISTS	0.7	1	6	0.1	1.3
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$2.8

FY 99

Prepared:

Project Number:
Project Title: SEA OTTER POPULATION BIOLOGY & HABITAT USE
Name: LISA M. ROTTERMAN, PH.D.

FORM 4B
Personnel
& Travel
DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:	Proposed
Description	FY 1999
CONSULTANT FOR QUANTITATIVE METHODS	10.0
PAGE COSTS FOR 4 PAPERS @ $1.0	4.0
Contractual Total	$14.0

Commodities Costs:	Proposed
Description	FY 1999
Commodities Total	$0.0

FY 99

Prepared:

Project Number:
Project Title: SEA OTTER POPULATION BIOLOGY & HABITAT USE
Name: LISA M. ROTTERMAN, PH.D.

FORM 4B
Contractual & Commodities DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases:			
Description	Number of Units	Unit Price	Proposed FY 1999
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage:		
Description	Number of Units	

FY 99

Project Number:
Project Title:
Name:

FORM 4B
Equipment
DETAIL

Prepared:

Project Title: Port Graham Pink Salmon Subsistence Project

Project Number:	99225
Restoration Category:	General Restoration
Proposer:	Port Graham Village Council
Lead Trustee Agency:	ADF&G
Cooperating Agencies:	Port Graham IRA Council
Alaska SeaLife Center	
Duration:	4th year, 5 year project
Cost FY 99	$75,600
Cost FY 00	$75,600
Geographic Area:	Port Graham, lower Cook Inlet
Injured Resource/Service:	Pink Salmon/Subsistence

RECEIVED
APR 15 1998
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

ABSTRACT

This project will help supply pink salmon for subsistence use in the Port Graham area during the broodstock development phase of the Port Graham hatchery. Because local runs of coho and sockeye salmon, the more traditional salmon subsistence resource, are at low levels pink salmon are being heavily relied on for subsistence. This project will help ensure that pink salmon remain available for subsistence use until the more traditional species are rejuvenated. Two strategies are being employed; increased fisheries management surveillance to maximize use of adult pink salmon return and increasing marine survival of hatchery produced pink salmon.

INTRODUCTION

This project will help underwrite the hatchery production of pink salmon for subsistence use in Port Graham. Normally pink salmon are not heavily utilized for subsistence. However, the local sockeye run has been very depressed and is just now beginning to respond to rehabilitation efforts, and the coho subsistence harvest at about 15% of its historic level. This has resulted in a sharp increase in the number of pink salmon harvested for subsistence in recent years. Unfortunately, the pink run to Port Graham is also suffering. Escapement into the Port Graham River has barely met the minimum goal for five of the last six years (the 1995 return was somewhat better).

A salmon hatchery is being developed in Port Graham. Its principal mission is to build the pink salmon run back up to levels that will allow commercial exploitation. When this objective is achieved the impact of the subsistence harvest on pinks will be negligible. At this point in time however, the subsistence harvest has a significant impact. The hatchery is in the broodstock development phase. The more eggs that are put in incubation the faster the hatchery will achieve its goals. The low pink returns to the Port Graham River coupled with the subsistence harvest on the hatchery returns is limiting the number of eggs that can be put in the hatchery and extending the time it will take for the hatchery to build the broodstock it needs to become self sufficient.

The EVOS clean-up effort had a negative impact on the Port Graham pink salmon as it did on the local coho and sockeye runs. Boom deployment during the early phases of the clean up trapped a large number of outmigrating pink salmon fry in the boom curtain on the ebbing tides causing high levels of mortality. It is possible that these losses are contributing to the poor even year returns that have been experienced recently.

This project is a small piece of the overall Port Graham pink salmon enhancement program. It comprises about a third of the overall Port Graham pink salmon enhancement budget. Port Graham pink salmon enhancement program complies with all state policies governing salmon enhancement activities including disease, genetics and harvest management. All required reviews and permits have been obtained for the hatchery program including this project. This project is designed to become self-sustaining beyond the development stage which is currently estimated to occur by the end of the decade.

NEED FOR PROJECT

A. Statement of Problem

The salmon runs to the Port Graham area are at low levels, partly as a result of the *Exxon Valdez* oil spill. As a consequence it has become more difficult for Port Graham villagers to meets their subsistence needs for salmon. Because of their four to five year life cycles, it will take a long time for the sockeye and coho runs to rebuild. A large number of the pink salmon that are being produced by the hatchery now being developed in Port Graham are being taken in the local subsistence fishery. Although the subsistence harvest of hatchery fish is helping to make up for the lack of wild fish, it is making it far more difficult for the hatchery to develop the broodstock it needs to become self-sufficient. Unless the schedule for developing broodstock can be

maintained, the hatchery will lose its positive benefit/cost ratio and may have to be closed.

A fire on January 13, 1998 in the building housing the hatchery destroyed the entire main hatchery facility including all the pink and sockeye eggs that were being incubated there. This was a major setback to the pink salmon broodstock development program and the local sockeye salmon rehabilitation effort. A newly started coho supplementation effort that was using an adjacent building to the hatchery for incubation and rearing is being curtailed so that this building can be converted to a pink and sockeye salmon incubation facility. The loss of the coho program and the setback in the pink and sockeye programs will result in less fish returning to the Port Graham and Nanwalek area. This will put additional subsistence harvest pressure on both wild and hatchery salmon that will be returning to the area over the next few years.

It is appropriate that the hatchery contribute pinks to the subsistence fishery. However, extraordinary methods will need to be employed for the hatchery to provide for the subsistence fishery as well as maintain its broodstock development schedule. These will include procedures to enhance the survival of juvenile pinks released from the hatchery, and coordinating with ADF&G to maximize the number of wild adult pink salmon returning to Port Graham that can be collected for broodstock.

B. Rationale/Link to Restoration

The importance of subsistence to the Native villages in the oil spill area has been recognized by the EVOS Trustee Council in its November 1994, *Exxon Valdez Oil Spill Restoration Plan*. This project will help preserve the subsistence lifestyle in Port Graham by providing additional salmon for subsistence needs. Harvest of these hatchery produced salmon will take pressure off the local wild runs, helping them in their recovery effort. Using an enhanced resource to replace harvest of an injured resource is an accepted strategy under the Restoration Plan.

C. Location

The project will be conducted at Port Graham with the bulk of the benefits accruing to the Port Graham village.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

The Port Graham Village Council is submitting this proposal. The Port Graham hatchery is owned and operated by Port Graham Hatchery, Inc., an arm of the Port Graham Village Council. The Port Graham Village Council will manage this project under a contract with ADF&G.

PROJECT DESIGN

A. Objectives

Use the Port Graham hatchery to provide pink salmon for local subsistence use while maintaining the hatchery's pink salmon broodstock development schedule.

B. Methods

This will be the forth year of a proposed five year project. Two basic strategies will continue to be employed to meet the objective. The first will be to supplement the ADF&G monitoring of the Port Graham pink salmon return and the second will be to enhance the juvenile to adult survival of the hatchery produced pink salmon through an extended rearing program. A brief discussion of each approach is given below.

The Port Graham River pink salmon run is the source of the hatchery broodstock. A program has been established to work closely with ADF&G in monitoring the pink salmon return to Port Graham each year in order to get as precise an estimate as possible on the wild and hatchery return. This program supplements the normal management stream and bay surveys of Port Graham that ADF&G conducts. It includes additional stream surveys and closely monitoring the subsistence fishery harvest. This program has established regular lines of communications between Port Graham and ADF&G. By coordinating effort and keeping close track of the pink salmon return, it has been possible to maximize the harvest of pink salmon while ensuring that the Port Graham River pink salmon escapement goal is met. This program will be continued in FY 98.

The second approach will apply techniques to increase the fry to adult (marine) survival of hatchery produced pink salmon. Normal hatchery practice involves holding pink salmon fry in saltwater pens after they emerge from the incubators. These fish are put on feed and held until the first mature zooplankton bloom that usually occurs in the later part of May in the Port Graham area. Normal holding time is 3 to 4 weeks. The marine survival with this technique has been poor, ranging between 1 and 2.5%.

Test lots of pink salmon fry reared at Port Graham to an average weight of 8 grams (the threshold size at which pinks leave the near shore area for the high seas) had survival rates of 7% to 10%. Although this was very encouraging there are major problems with holding pink salmon fry the four months it takes to rear them to 8 grams. First, rearing fish to that size is expensive. Second, there is a high risk that fish held that long may contact disease or otherwise be injured or killed. Of particular concern is the potential for the rearing fish to contact "warm water vibrio", a highly contagious bacterial infection that pink salmon fry are susceptible to if reared in salt water warmer than 10° C. A group of pink salmon fry that were intended to be reared to an average weight of 8 grams under this project in FY 96 had to be released early because of an outbreak of warm water vibrio.

Studies undertaken at other pink salmon hatchery facilities in the state indicate that rearing salmon to a minimum of one gram also greatly enhances marine survival. Nearly eight times as many fry can be reared to 1 gram rather than 8 grams for the same cost. In addition, the reduced holding time required for producing 1 gram fish as opposed to 8 grams reduces the risk of loss from injury or disease. A group of pink salmon fry were successfully reared to the 1 gram size and released as part of this project's FY 96 activities. An estimated 5% of this group survived to return as adults. A similar, perhaps larger, group of 1 gram fry will be produced in FY 99 to see if this marine survival rate can be repeated.

The Port Graham hatchery now has the capability to produce modest amounts of heated water, both fresh and salt. This provides the potential to accelerate development and growth of small groups of fish. In FY 99 a lot of 20,000 to 100,000 pink salmon will be incubated and reared on heated water with the objective of achieving a minimum average weight of 1 gram in time for release into the mature zooplankton bloom in late May. A search of the literature and conversations with other pink salmon hatcheries in Alaska, indicate that a test of this sort has never been conducted. However, it would seem that releasing large size pink salmon fingerling into the mature zooplankton bloom would greatly enhance marine survival.

All fish in both the 1 gram fingerling lot reared in ambient temperature water and the 1 gram fingerling lot produced with heated water will be otolith marked with a separate mark for each lot. For comparison purposes a third lot of pink salmon will receive the normal treatment of incubating and rearing in ambient temperature water for release into the zooplankton bloom. This lot will not be marked.

SUPPLEMENTATION CRITERIA. This is a supplementation project. The following is a brief discussion of how the project fits under each of the supplementation criteria presented in the *Invitation to Submit Restoration Projects for Federal Fiscal Year 1996 and Draft Restoration Program: FY 96 and Beyond*, March 1995, pages 34-35.

Benefits of Supplementation. This project will provide additional pink salmon for harvest in the subsistence fishery in the Port Graham area. By shifting some of the subsistence harvest to hatchery salmon this project will help Port Graham wild salmon stocks recover from their present low levels.

Generic Risk. The Port Graham pink salmon hatchery program was reviewed by the ADF&G, CFMD Genetics Section who determined that the program (which includes this project) meets all criteria of the state Genetics Policy for Salmon Enhancement. The program (including this project) has been awarded a state Fish Transport Permit.

Mixed-stock Fishery. The potential for the Port Graham pink salmon hatchery program (including this project) creating or exacerbating a mixed stock fishery program is minimal. The harvest of Port Graham pink salmon are spatially and/or temporally separated from other Kachemak Bay pink salmon stocks as well as other salmon species. There is very little overlap. The same is true with the other salmon species that spawn in the Port Graham area.

Monitoring and Evaluation. A portion of the pink salmon reared to 8 grams will be coded wire tagged. The local fisheries and the hatchery egg take will be monitored for marked fish.

Economic Criteria. This project, especially long term rearing pink salmon fry to increase adult survival, will negatively impact the hatchery benefit/cost ratio. However, not doing this project would either cause a reduction in the overall subsistence harvest in Port Graham as well as put additional pressure on the wild stocks, and/or extend the hatchery broodstock development phase to the point where operating the hatchery stops making economic sense.

Procedural Criteria. All evaluations (Regional Salmon Planning Team, Coastal Project Certification) of the Port Graham hatchery program (including this project) have been conducted

and all necessary permits (hatchery permit, fish transport permit, COE, DNR, CZM) have been obtained. This project has not been evaluated under the NEPA process.

C. Cooperating Agencies, Contracts and Other Agency Assistance

The Port Graham IRA Council will operate this project under a contract with ADF&G. The funds for stream survey air charters will be retained by ADF&G to supplement the normal management surveys of Port Graham.

SCHEDULE

A. Measurable Project Tasks for FY 99

October, 1998:	Incubators containing the lots intended for extended rearing and heated water rearing are identified and heat treated to produce a separate otolith mark for each lot.
November:	After eye-up eggs from the lot intended to reach 1 gram by late May are put on a heated water regimen.
May, 1999:	Heated water rearing lot intended to produce fingerling with average weight of 1 gram are released into zooplankton bloom.
May, 1999:	Fry receiving standard treatment (incubated and reared in ambient temperature water and held for release into zooplankton bloom) are released into zooplankton bloom.
late June, early July:	Lot held for extended rearing in ambient temperature water are released after having reached an average weight of 1 gram.
July 7 to August 31:	Monitor pink salmon return to Port Graham.
August 10 to August 25:	Capture hatchery broodstock.
August 28 to September 10:	Egg take.
April 2000:	Annual report on FY 99 work.

B. Project Milestones and Endpoints

The project objective will be successfully met if broodstock development phase is completed on schedule at the end of FY 00.

C. Completion Date

This project will end when the broodstock development phase at the Port Graham hatchery is complete. This is expected to occur by the end of FY 00.

PUBLICATIONS AND REPORTS

Annual reports	Describes project activities for the year, analyzes successes and

	problems, makes recommendations for improvements due April 1 following fiscal year being reported on.
Final report	Synopsis of each tear's activities with analysis of project as a whole. Due April 1 following final year of project.

PROFESSIONAL CONFERENCES

No travel to professional conferences will be paid for out of this project. However, hatchery staff will be attending the Alaska Hatchery Manager's Workshop and the Native American Fish & Wildlife Society meeting and at which they will give a presentation of the work done under this project.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

If funded, this project will be integrated into the overall pink salmon enhancement program in Port Graham.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

The production of a lot of fingerling with an average weight of 8 grams has been eliminated because of the high potential for this lot to contract warm water *Vibrio*. In its place heated water will be used to produce a lot of fingerling with an average weight of one gram from release during the mature zooplankton bloom in late May. This lot will test the efficacy of this strategy compared with rearing fry in ambient temperature water until they have achieved an average weight of 1 gram before releasing them.

PRINCIPAL INVESTIGATOR

Ephim Anahonak, Jr., Hatchery Manager
Port Graham Hatchery
P. O. Box 5543
Port Graham, AK 99603
phone (907) 284-2233
fax (907) 284-2238

Mr. Anahonak has been hatchery manager of the Port Graham hatchery for the past four years. He has had and will continue to have overall responsibility for the project.

OTHER KEY PERSONNEL

Paul McCollum, hatchery consultant. Mr. McCollum will advise the hatchery staff on the procedures and techniques needed to achieve project objectives.

David Daisy, fish culture consultant. Mr. Daisy will work with the hatchery staff and Mr. McCollum in project design, implementation and reporting.

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1999 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$0.0	$0.0
Travel	$0.0	$0.0
Contractual	$68.7	$70.7
Commodities	$0.0	$0.0
Equipment	$0.0	$0.0
Subtotal	$68.7	$70.7
General Administration	$4.8	$4.9
Project Total	$73.5	$75.6
Full-time Equivalents (FTE)		0.0
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

	Estimated FY 2000	Estimated FY 2001	Estimated FY 2002	Estimated FY2003	
	$75.0	$75.0	$0.0	$0.0	

Dollar amounts are shown in thousands of dollars.

Comments:

FY99

Prepared: 4/14/98

Project Number: 99225
Project Title: Port Graham Pink Salmon Subsistence Project
Agency: ADFG

FORM 3A
TRUSTEE
AGENCY
SUMMARY

4/14/98

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1999 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$31.6	$33.6
Travel	$0.0	$0.0
Contractual	$13.5	$13.1
Commodities	$12.4	$14.0
Equipment	$0.0	$0.0
Subtotal	$57.5	$60.7
Indirect	$11.2	$10.0
Project Total	$68.7	$70.7
Full-time Equivalents (FTE)		12.0
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

	Estimated FY 2000	Estimated FY 2001	Estimated FY 2002	Estimated FY 2003	
	$70.1	$70.1	$0.0	$0.0	

Dollar amounts are shown in thousands of dollars.

Comments:

FY99

Prepared: 4/14/98

Project Number: 99225
Project Title: Port Graham Pink Salmon Subsistence Project
Name: Port Graham Village Council

FORM 4A
Non-Trustee
SUMMARY

4/14/98

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1999 - September 30, 1999

Personnel Costs:							
	Name	Position Description		Months Budgeted	Monthly Costs	Overtime	Proposed FY 1999
		Fish Culturist		6.0	2.8		16.8
		Fish Culturist		6.0	2.8		16.8
		Subtotal		12.0	5.6	0.0	
						Personnel Total	$33.6

Travel Costs:						
	Description	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FY 1999
					Travel Total	$0.0

FY99

Prepared: 4/14/98

Project Number: 99225
Project Title: Port Graham Pink Salmon Subsistence Project
Name: Port Graham Village Council

FORM 4B
Personnel
& Travel
DETAIL

4/14/98

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1999 - September 30, 1999

Contractual Costs:	Proposed
Description	FY 1999
Freight	1.0
Maintenance & Repair	0.8
Seine boats for broodstock collection 8 days @ $500/day	4.0
Air charter for stream surveys - to ADF&G	2.3
Technical consultants	5.0
Contractual Total	$13.1

Commodities Costs:	Proposed
Description	FY 1999
Fish Food	10.1
Skiff fuel/oil	0.3
Plumbing supplies	0.2
Building supplies	0.3
40 x 40 rearing pen nets	3.1
Commodities Total	$14.0

FY99

Prepared: 4/14/98

Project Number: 99225
Project Title: Port Graham Pink Salmon Subsistence Project
Name: Port Graham Village Council

FORM 4B
Contractual & Commodities DETAIL

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1999 - September 30, 1999

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	

FY99

Prepared: 4/14/98

Project Number: 99225
Project Title: Port Graham Pink Salmon Subsistence Project
Name: Port Graham Village Council

FORM 4B
Equipment
DETAIL

4/14/98

RECEIVED
APR 15 1998
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

Project Number:	97230 (fy99)
Restoration Category:	General Restoration
Proposer:	Prince William Sound Economic Development Council
Lead Trustee Agency:	ADNR
Cooperating Agencies:	USFS
Alaska Sealife Center:	No
Duration:	2nd Year, two year project
Cost FY99:	$65,000
Geographic Areas:	Prince William Sound
Injured Resource/Service:	Marbled Murrelets, Bald Eagle, Common Loon, Common Murre, Harlequin Duck, pink salmon (wild-run), sockeye salmon, sea otter, harbor seal, blue mussel, and various subtidal and intertidal organisms

ABSTRACT

This project is a continuation of the FY98 project, Valdez Duck Flats Conceptual Management Plan. Continuation is dependent on successful acquisition of parcels of property from the University of Alaska and a private owner. However, it is appropriate to initiate design of a monitoring and public information program related to the Duck Flats, sensitivity to impact, and relationship to resources injured in the oil spill. Prince William Sound Economic Development Council will work with the cooperating agency group, the City of Valdez, the Valdez School district and the Prince William Sound community College in developing a suitable monitoring and education program.

INTRODUCTION

The Valdez Duck Flats (Duck Flats) are centrally located in the community of Valdez, Alaska 1). They comprise a rich intertidal zone, bounded by downtown Valdez to the west, the Richardson Highway to the north, and the Old Valdez townsite to the east. The Duck Flats provide a relatively unique habitat in Valdez Arm of Prince William Sound supporting numerous species of fish and wildlife, especially aquatic birds, anadromous fish, marine mammals, and intertidal organisms of the types impacted by the *Exxon Valdez* Oil Spill. Numerous spill-impacted species are part of the greater ecology of the Duck Flats including, but not limited to: Marbled Murrelets, Bald Eagle, Common Loon, Common Murre, Harlequin Duck, pink salmon (wild-run), sockeye salmon, sea otter, harbor seal, blue mussel, and various subtidal and intertidal organisms. In addition, the proximity of the Duck Flats to downtown Valdez and the Richardson Highway provides an unusual opportunity for public access to this unique habitat, and recreation/ tourism use of the area occurs at both developed visitor areas, such as the Crooked Creek viewing platform and the municipal Dock Point facilities, and at other points where developed facilities are not available.

The Prince William Sound Economic Development Council (PWSEDC), working with the City of Valdez and EVOS Trustees, has proposed creation of a conceptual plan to aid in the recovery of spill impacted populations, maximizing the public educational value of the Duck Flats while mitigating adverse effects of human access to the area, and identifying land use issues that may affect the value of the Duck Flats as habitat for recovering species. This project focuses on the western half of the Duck Flats, where improving and controlling public access is most feasible. The EVOS Trustees are also attempting to acquire some specific tracts of land. However, acquisition has not been resolved as of this time, and it is premature to go ahead with facility location and design until resolution is reached.

Public and agency comment during the first phase of the project has indicated an interest in monitoring existing conditions and potential impacts on the Duck Flats. It is appropriate to initiate design of a monitoring and public information program related to the Duck Flats, sensitivity to impact, and relationship to resources injured in the oil spill. There are opportunities for partnerships and matching efforts with the Prince William Sound RCAC (watershed planning), City of Valdez (informational placards) and the Community College (student monitoring and research).

NEED FOR THE PROJECT

Statement of Problem

The Valdez Ducks Flats are a complex of protected, low-lying estuarine salt marsh and intertidal habitats, which encompass approximately 1,000 acres, of which approximately 460 acres are tidal flats (Figure 4). Duck Flats is the largest salt marsh in Port Valdez and one of the largest in Prince William Sound (Hogan and Colgate, 1980; Dall and Nichles, 1981). Salt marsh habitats are relatively scarce in the region, which adds to the value and importance of this area. The vegetated wetlands within the Duck Flats consist of a mosaic of plant communities based on exposure to saltwater, plus substrate types, drainage patterns, and soil moisture levels. The Duck Flats are a highly productive ecosystem that supports a very diverse community of marine invertebrates, marine and anadromous fish populations, seasonally abundant waterfowl,

and several species of terrestrial and marine mammals. Productivity from this marsh is also exported to systems remote from the Duck Flats, such as the deeper portions of Port Valdez or nearshore communities throughout the general area.

Potential for Visitation and Public Education

- the Valdez Duck Flats is one of a few EXXON Valdez oil spill restoration and enhancement sites located along the road system in southcentral Alaska
- areas within or adjacent to the Duck Flats receive a significant volume of annual visitors (Crooked Creek viewing platform and pullout, Dock Point trail system); Valdez is served by major tour operators and the State Marine Highway system
- the Duck Flats offers opportunities for public education with regard to both the EXXON Valdez oil spill (history of the spill and response activities, representative resources affected by the spill, restoration and enhancement program) and general coastal wetland function and values

Rationale/Link to Restoration

Management of the Valdez Duck Flats, through property acquisition, development of controlled public access, and implementation of public education programs, provides a unique opportunity to restore and enhance resources affected by the EXXON Valdez oil spill and provide public education:

Potential for Meeting EVOS Program objectives

- aid in recovery of spill impacted wildlife: several species affected by the EXXON Valdez spill utilize the Duck Flats and include several species of salmon, sea otters, harbor seals, waterfowl and shorebirds, and blue mussels
- protect habitat and species from pollution
- protect the area from further human impacts

Location

City of Valdez, Prince William Sound

COMMUNITY INVOLVEMENT

Extensive community involvement has occurred through the first phase of this project, and would continue in this Phase. Public input on monitoring and education program design would be solicited through a series of public meetings.

PROJECT DESIGN

Objectives

- work with the cooperating agencies to identify parameters and sites for monitoring baseline conditions and potential impacts

- work with agencies, the educational institutions, and the general public to develop an acceptable local data collection and monitoring program

- work with the cooperating agencies, city of Valdez and private property owners to develop a public information/education program on the values of the Duck Flats, sensitivity to impact, and linkage to resources injured by the Exxon Valdez oil spill

Methods

PWSEDC will work with the cooperating agencies to identify parameters and sites for monitoring baseline conditions and potential impacts. These will be presented in a public meeting in Valdez for comment and modification. We will then work with agencies, the educational institutions, and the general public to develop an acceptable local data collection and monitoring program. Training and a monitoring manual will be provided for local participants in the monitoring program. Finally, PWSEDC will work with the cooperating agencies, city of Valdez and private property owners to develop a public information/education program on the values of the Duck Flats, sensitivity to impact, and linkage to resources injured by the Exxon Valdez oil spill.

SCHEDULE

Project Tasks

- identify parameters and sites for monitoring baseline conditions and potential impacts by November 1, 1998
- Public Meeting Valdez by November 30, 1998
- develop an acceptable local data collection and monitoring program by January 15 1998
- Prepare monitoring manual and provide local training by March 1, 1999
- develop a public information/education program on the values of the Duck Flats, sensitivity to impact, and linkage to resources injured by the Exxon Valdez oil spill by April 15, 1999

Milestones

see above

PUBLICATIONS/REPORT

- Draft and final progress reports on parameters and sites for monitoring baseline conditions

and potential impacts

- draft and final progress reports on acceptable local data collection and monitoring program
- draft and final training and monitoring manual
- draft and final public information/education program on the values of the Duck Flats, sensitivity to impact, and linkage to resources injured by the Exxon Valdez oil spill
- draft and final report on project

PROPOSED PRINCIPLE INVESTIGATOR

Jon Isaacs
Dames & Moore
5600 B street
Anchorage, Alaska 99518
(907)562-3366/fax (907)562-1297

DETAILED BUDGET

	Proposed FY99
Personnel	**$ 0**
Travel	**$ 5,000**
Contractual	**$50,000**
Indirect	**$10,000**

Travel: for use by staff in travel between Anchorage and Valdez

Commercial: one contractor, with 1 subcontractor will be doing the majority of the work

General Administration: The Prince William Sound Economic Development Council will administer the project and facilitate agency and public involvement.

99245

COMMUNITY-BASED HARBOR SEAL MANAGEMENT AND BIOLOGICAL SAMPLING

Project Number:	99245
Restoration Category:	General Restoration
Proposer:	Alaska Native Harbor Seal Commission
Lead Trustee Agency:	Alaska Department of Fish and Game
Cooperating Agencies:	
Alaska SeaLife Center:	
Duration:	4th year, six-year project
Cost FY 96:	128,500
Cost FY 97:	114,900
Cost FY 98:	84,700
Cost FY 99:	85,900
Cost FY 00:	80,000
Cost FY 01:	80,000
Cost FY 02	80,000
Geographic Area:	Prince William Sound, Cook Inlet, Kodiak, Alaska Peninsula
Injured Resource/Service:	Harbor seals; subsistence

RECEIVED
APR 14 1998
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

ABSTRACT

This project continues work supported through previous harbor seal restoration projects. A biological sample collection program, implemented in FY96 and expanded in FY97, in Prince William Sound, lower Cook Inlet, and Kodiak Island will continue. Village-based technicians are selected by the Alaska Native Harbor Seal Commission (ANHSC) and trained by the Alaska Department of Fish and Game to collect samples. The samples are transported to Anchorage or Kodiak for further sampling and distribution to participating scientists for analysis. The ANHSC will also organize a two-day workshop, and produce and distribute a newsletter with summaries of the biological sampling program.

INTRODUCTION

The goal of this continuing project is to support collaboration between subsistence hunters of harbor seals, scientists, and resource management agencies to assess the factors which are affecting the recovery of the harbor seal population of the oil spill area and to identify ways to reduce these impacts. In FY 94 (Project 94244) and FY 95 (95244), the Trustee Council provided funding for the Alaska Department of Fish and Game, Division of Subsistence, to compile available data, collect additional information, and to organize workshops and community meetings with scientists and subsistence users. Participants in the workshops concluded that the lack of a formal organization which represents subsistence users of harbor seals is a major impediment to communication between scientists and hunters and to the inclusion of subsistence hunters as full partners in harbor seal research and restoration. To fill this gap, Alaska Native participants in the harbor seal restoration workshop of March 2, 1995 voted to form an Alaska Native Harbor Seal Commission. In FY 96, Project 96244 assisted the ANHSC by providing it with funds to organize two workshops held in conjunction with commission meetings and to produce and distribute two newsletters and other communications. Additional workshops took place under Project 97244 in March 1997 and under Project 98244 in March 1998.

A second consensus point reached at the workshops was that subsistence hunters are in an excellent position to assist in scientific studies through providing biological samples from subsistence-taken animals. A goal of Project 96244 was to test the practicality and effectiveness of a community-based harbor seal biological sampling program, designed and administered cooperatively between the University of Alaska, the Alaska Native Harbor Seal Commission, and the Department of Fish and Game. In FY 97, this program was expanded to collect samples from the Kodiak Island area and add Valdez to the sample communities in Prince William Sound. This program continued in FY 98. As of January 1998, samples from 110 animals had been distributed for analysis. Table 1 reports how the samples have been distributed. [Included in this table are samples taken from other areas of the state, including southeast Alaska and western Alaska. Although the collection and processing of these samples in not funded through this EVOS restoration project, they are included in this table to illustrate how this program is integrated with state-wide efforts to restore harbor seal populations.] Table 2 shows the geographic origin of the samples from the oil spill region, as of March 1998. This project was originally scheduled to conclude in FY 98. However, the biological samples are an important part of the Trustee Council's ongoing harbor seal research effort, and the Council invited a proposal to continue the biosampling in FY 99.

Another consensus point reached at the workshops was that there needs to be a cooperative exchange involving the traditional knowledge and skills of subsistence hunters and the research efforts of western scientists. In order to facilitate this exchange, the Division of Subsistence organized a traditional knowledge database (called "Whiskers!") which incorporates the available information about harbor seals. The Division demonstrated the database at the Restoration Workshop in January 1996 and at ANHSC workshops in March 1996 and September 1996. It was also distributed to subsistence users, resource managers, and scientists through an askSam read-only program. In FY 97, the database was updated through key respondent interviews in the Prince William Sound and lower Cook Inlet communities. The collection of TEK was not a featured objective in FY 98 and will not be in FY 99, although information collected during other

Table 1. Distribution of Subsistence Harbor Seal Samples Collected under EVOS Restoration Project 96244, 97244, & 98244 (as of 1/25/98)

Tissue	# Samples	Contact	Disposition, status, and analysis
Stomachs	105	V. Vanek, ADF&G	Sent to UBC for prey identification
Teeth	89	R. Small, ADF&G	Extracted at UAF Museum; age & growth history to be determined by NMFS in 1998
Whiskers	109	D. Schell, UAF	Used in stable isotopes analyses (EVOS # 97170)
Brain and collagen[1]	89	A. Hirons, UAF	Used in stable isotopes analyses (EVOS # 97170)
Blubber	96	B. Fadely, et al., UAF	Blubber composition studies completed and continuing (EVOS Proj. 95117)
		K. Frost, ADF&G	Sent to Dalhousie University for fatty acid analysis (EVOS Proj. 95064)
Skin/muscle	110	R. Westlake, NMFS	Sent to NMFS La Jolla for genetic analysis
Reproductive tracts	19	K. Pitcher, ADF&G	Stored for future reproductive analysis
Skulls	89	L. Quakenbush, UAF	UAF Museum staff is cleaning skulls for archive and morphometric examination
Archived tissue heart liver kidney blubber skeletal muscle	98	A. Runck, UAF	Tissues subsampled and archived in -70C freezer at UAF Museum; available for future contaminant analyses.

[1] Collagen from ligaments or tendons; also using muscle, blubber, skin, heart, liver, and kidney

Table 2. Summary of Harbor Seal Biosamples Collected, as of 3/7/98
Prince William Sound/Lower Cook Inlet/Kodiak Island

Community	Number of Seals Sampled	
	Full Set	Partial Set
Chenega Bay	4	3
Nuciiq	2	0
Cordova	21	0
Tatitlek	41	29
Valdez	3	0
Seward	0	0
Nanwalek	5	1
Port Graham	0	0
Seldovia	1	0
Afognak Island	1	1
Akhiok	2	0
Old Harbor	1	1
Port Lions	1	0
GRAND TOTAL	82	35

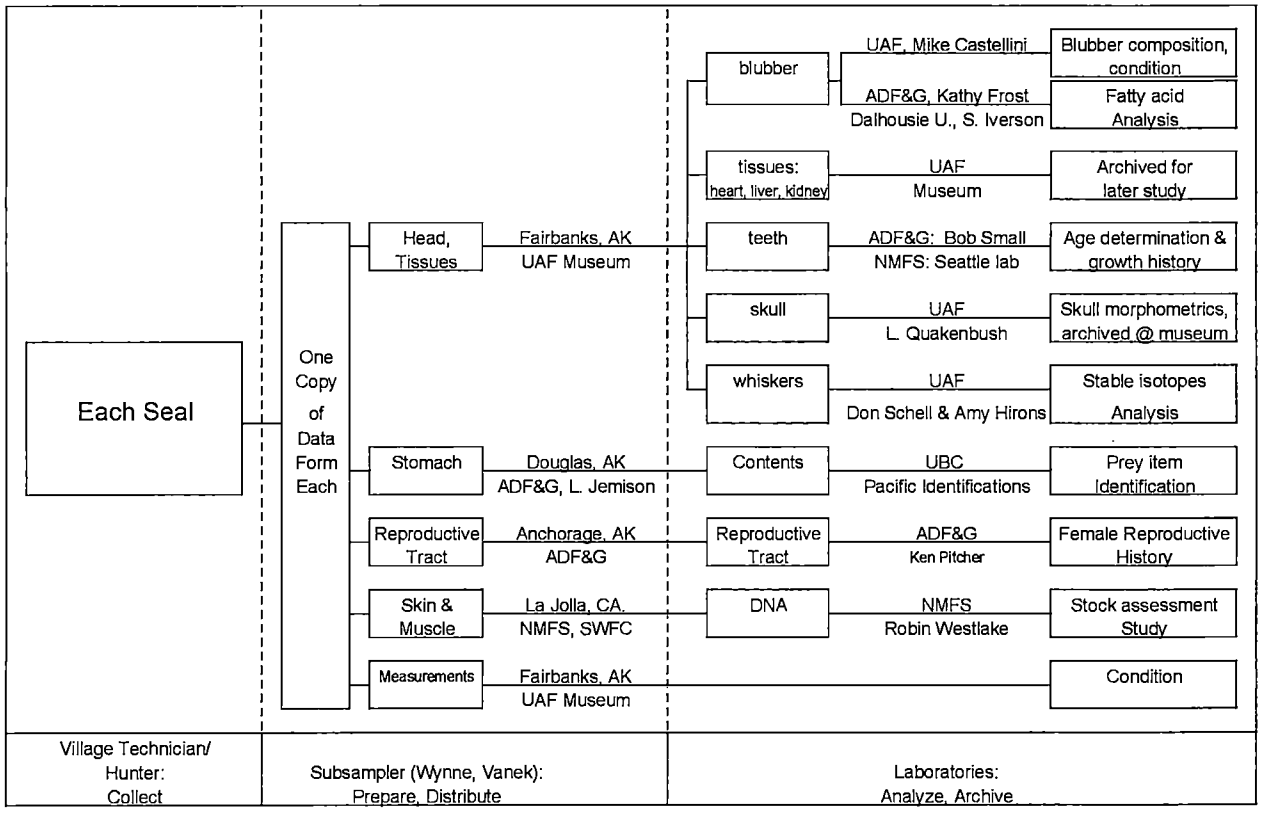

Figure 1. EVOS Project 244: Sample Distribution and Chain of Responsibility (As of 1/98)

activities will be incorporated into the data base. The collection and application of TEK is a featured component of proposed new project entitled "Community-based Harbor Seal Research."

Finally, this project will support other restoration projects proposed for FY 99 and beyond, such as Harbor Seals: Monitoring and Field Research (\064), , Harbor Seals: Health and Diet (\341), the Community Involvement and Traditional Knowledge Project (\052), and the Youth Area Watch (\210), as well as a new project proposed for FY 99, "Community-based Harbor Seal Research." The project will also contribute to the Trustee Council's recovery objectives for subsistence by facilitating involvement of subsistence users in the restoration process.

NEED FOR THE PROJECT

A. Statement of Problem

The harbor seal populations of Prince William Sound and the northern Gulf of Alaska were in decline before the oil spill for unknown reasons. The spill injured these populations, adding to the decline, and they are not recovering. Harbor seals are a primary subsistence resource in the Alaska Native communities of the oil spill region. Subsistence harvests of harbor seals have declined in many of communities since the spill because of the reduced population size and voluntary efforts on the part of hunters to limit their harvests to aid in recovery. In order to assess these efforts and to identify measures which subsistence users could take to further assist in

harbor seal restoration, the Trustee Council funded projects in FY 94 and FY 95 to compile existing data, collect additional information, organize meetings of scientists and subsistence users, and develop recommendations for hunters. Two workshops took place. Among other things, participants at the workshops recognized that without a formal organization representing subsistence hunters of harbor seals, it was unlikely that a consensus on recommendations could be developed or that a dialogue between hunters and scientists could be maintained. Workshop participants stressed that strong involvement of hunters in research activities and management decisions was an essential ingredient in any plan for harbor seal recovery. Several other restoration projects are examining the potential causes of the harbor seal population decline and lack of recovery, including mortality caused by humans. The need exists to continue to follow through on the workshop recommendations to support these harbor seal restoration efforts.

B. Rationale/Link to Restoration

The recovery objective for harbor seals states that recovery will have occurred when harbor seal population trends are stable or increasing. Based on findings from two workshops which involved scientists and subsistence users of harbor seals (conducted under Projects 94244 and 95244), meeting this recovery objective is enhanced by continuing dialogue between scientists and subsistence users, involving subsistence hunters in research efforts, involving traditional knowledge in scientific studies, and collaborating in the development of recommendations for subsistence hunters about how they can assist in harbor seal recovery. For example, subsistence hunters can provide substantial information about the winter location and abundance of seals, the condition of seals taken for subsistence purposes, and seal behavior. This project will implement the recommendations of the workshops by continuing a biological sampling program, supporting the activities of the Alaska Native Harbor Seal Commission, funding a workshop in which data and hypotheses are collaboratively reviewed, and providing other technical support to the Alaska Native Harbor Seal Commission.

The FY 96, FY 97, and FY 98 Work Plans included research projects to monitor seal population trends and conduct research to discover why harbor seals are not recovering. These are likely to continue in FY 99. Assessing parameters that affect marine mammal abundance and health requires access to and examination of animals or tissues. Marine mammals are inherently difficult to study and the collection and examination of tissues is further complicated by legal limitations imposed by federal protective measures and permitting procedures. Sacrificing animals for research purposes is either undesirable or illegal, and beachcast carcasses are often too decomposed to be of value. A potentially invaluable source of fresh specimens exists in Alaska, where coastal Alaska Natives still legally use marine mammals for subsistence or handicraft purposes. In the first three years of this project, a community-based bio-sampling program was successfully developed. This program has succeeded because:

1. Local people support the program and its goals, are involved in the sample collection, understand the significance of the data being collected, are willing to store and ship samples from villages to a central receiver, and are trained and willing to record data and collect samples as instructed.

2. Samples are easily collected, stored and shipped; they are subsequently sub-sampled by ADF&G staff; are analyzed in due time; and results are returned to villages.

Furthermore, over the last several years, the Trustee Council has attempted to involve spill-area communities more fully in the restoration process. The biosampling effort is a prime example of this involvement and collaboration.

C. Location

The biological sampling portion of the project includes the Prince William Sound communities of Cordova, Chenega Bay, Valdez, and Tatitlek; the lower Cook Inlet communities of Seldovia, Port Graham, and Nanwalek; and two Kodiak Island communities, Akhiok and Old Harbor Table 1). Other communities that receive information from the project include Seward, Ouzinkie, Kodiak, Port Lions, Larsen Bay, Karluk, Chignik Bay, Chignik Lagoon, Chignik Lake, Ivanof Bay, and Perryville.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

Community and subsistence user involvement in the restoration process and in harbor seal recovery is a central purpose of this project. A primary goal is to support the activities of the Alaska Native Harbor Seal Commission. With project funds, the ANHSC will organize a two-day workshop for representatives of oil spill area communities which use harbor seals for subsistence purposes conducted in conjunction with an ANHSC meeting. The ANHSC will also organize community meetings to inform hunters of restoration activities, harbor seal research, and ANHSC functions. These meetings serve as a means to develop subsistence hunter involvement in ongoing research efforts. The ANHSC will also produce a newsletter. As part of the continuing biological sampling effort, the ANHSC will select technicians (most of whom will be subsistence harbor seal hunters) in participating communities. New technicians will be trained by ADF&G staff to collect biological samples. Subsistence hunters will supply the samples and will be trained through the use of an instructional video (produced in FY 96), and through hands-on instruction as needed. Also, participants in the Youth Area Watch Project (\210) will be included in project activities, including community technician training sessions and the workshop.

PROJECT DESIGN

A. Objectives

The primary premise upon which this project is based is that restoration of harbor seal populations is facilitated by involving subsistence users in research and management activities. Key to the success of this effort is support for the activities of the Alaska Native Harbor Seal Commission. Specific objectives include to:

1. Continue a community-based program to collect biological samples and other information from harbor seals in Prince William Sound and the northern Gulf of Alaska involving hunters from Cordova, Tatitlek, Chenega Bay, Valdez, Seldovia, Port Graham, Nanwalek, Akhiok, and Old Harbor. Specific sub-objectives include:

   a. Train local technicians and hunters in biological sample collection procedures
   b. Maximize sampling for efficiency and coordination with other harbor seal projects
   c. Evaluate the program's effectiveness and develop a more long-term funding plan.

2. Collect biological samples and other information from harbor seals harvested by subsistence hunters in 9 communities: Tatitlek, Chenega Bay, Valdez, Cordova, Seldovia, Port Graham, and Nanwalek, Akhiok and Old Harbor. Provide these samples to researchers for analysis.

a. Collect information about the number, sex, approximate age and place and date of harvest for harbor seals taken in each village
b. Collect biological samples to be analyzed in cooperation with other harbor seal projects, including blubber, whiskers, skin, female reproductive tracts, and stomachs (see Table 1 and Figure 1).
c. Store samples in a community freezer and periodically ship samples to Anchorage or Kodiak for further processing and distribution for analysis
d. Develop and maintain a procedure for tracking disposition of samples and results of analyses

3. In collaboration with the Alaska Native Harbor Seal Commission, communicate information about results of harbor seal studies to hunters and scientists on a regular basis through community meetings, a workshop, a newsletter, and the development of a database.

a. Conduct a two-day workshop, in conjunction with a meeting of the ANHSC, which includes hunters from oil spill communities, harbor seal biologists, and agency representatives, to review recent findings about harbor seals and discuss important issues
b. Conduct meetings in selected communities participating in the biological sampling program for hunters and project personnel to review and exchange scientific information and traditional knowledge
c. Produce an informational newsletter describing results of harbor seals studies, ongoing harbor seal research, and community involvement
d. Maintain a database of biosamples and results

4. Collaboratively produce recommendations for subsistence users of harbor seals which derive from study findings and the discussions at community meetings and workshops

a. These recommendations will be based on traditional knowledge, contemporary observations, and scientific findings
b. Recommendations will be developed at workshops and community meetings.

5. Evaluate the program's effectiveness and explore options for a long-term funding plan for the biological sampling program

6. Coordinate with the Youth Area Watch Program (Project /210) to involve participants in that program in biological sampling and workshops and to support a year-long curriculum based on information gathered through the biosampling program.

B. Methods

Objectives 1, 2, & 6: Biological Sampling Program

For Objectives 1 and 2, the Biological Sampling Program, the following procedures will be used:

1. Training. As part of Project 96244 (and revised as part of 97244 and 98244), a marine mammal biologist, Kate Wynne of the University of Alaska, and Vicki Vanek, a veterinarian with the Division of Subsistence (ADF&G) compiled protocols, synthesized these into useable formats, developed data forms, labels, and sampling kits, and incorporated instructions for their use into a training program. In FY 99, Vanek will assume full responsibility to apply these materials and revise them as appropriate.

Instruction. Sampling requires instruction or training of community-based sampling technicians, who ideally are also subsistence seal hunters. Any new village-based technicians will attend a full-day sampling training session in Kodiak or Anchorage Vanek will: provide a detailed explanation of project goals, and significance and use of data to be collected; distribute sampling kits; explain and demonstrate sampling techniques and use of equipment; and distribute written and graphic instructional materials to take to villages. An alternative is for Vanek to travel to the community to train a replacement.

Other hunters will be informed of program objectives and specified sampling requirements through communication with village technicians and other project personnel and through written, graphic, and video instructional materials. If hunters or technicians need additional "hands on" training, Vanek will be available to travel to the communities to provide this assistance.

2. Training materials.

Manual: This was produced in FY 96. It includes step-by-step diagrams and a visual guide. It is waterproof and is included in the sampling kit. Labor is involved in laying out, laminating, and binding each new manual for newly-trained local assistants.

Examples: If a seal is available, at the training session participants work on an actual animal, filling in data forms and labels. Otherwise, the training relies on slides, the training video, and artificial props.

Video. In FY 96, a training video was produced by ADF&G, incorporating footage shot at the two training sessions. It has been distributed to the technicians trained at these sessions. The video includes: project rationale and objectives; footage of current research and population declines; significance and use of data to be collected; demonstrations of how to fill in data forms and labels; demonstrations how to use sampling kit and supplies; demonstrations of where and how to remove tissues from animals; and demonstrations of how to sub-sample, bag, and label tissues.

3. Sample collection

Technicians. There is a village-based technician in each participating community, whose responsibilities are to take samples from seals taken by themselves or participating hunters, record data as requested, assure access to freezer and sampling supplies, notify Vanek or Riedel when supplies are low or freezer is nearly full, and load and ship coolers with samples to Anchorage, Cordova, or Kodiak.

Key hunters. Ideally at least two hunters per village provide subsistence taken seals from which the technicians take samples, and record data as requested.

Sample size and distribution: It is difficult to predict the number of samples that may be collected in this program annually or by community, but we have assumed an average of 10 animals per community while designing the sampling strategy and estimating project costs.

Tissues to be collected. A minimal sample can be collected by technicians in each village with relative ease and subsequently sub-sampled in Anchorage or Kodiak to provide the suite of tissue samples required. We have trained technicians and hunters to record information about harvest location and animals' sex, evidence of tags or markers, and standard measures of length and girth and blubber thickness. Technicians are trained to collect the whole head; stomach (after tying off both ends), samples of liver, heart, blubber, and kidney; and female reproductive tract. Although collecting the reproductive tracts and claws is highly desirable, it is realistic to assume they will be collected opportunistically only from those hunters willing to dedicate extra effort required to collect them.

Sampling procedure.

Step 1. In the community: village technician receives sample from the hunter, or works with an animal they have taken themselves. The data form is filled out by hunters in the field and in the community by the technicians, or by youth from the Youth Area Watch project. The data form is placed inside the specimen bag with samples for village-based storage. Technicians have a kit that includes supplies adequate for sampling of 10 animals. Among the items in each kit are 1) ziploc sampling bags for collection of the head, stomach, and tissues, 2) large garbage bags in which to place the sample bags collected from each animal, and 3) data forms and specimen labels. The head, stomach, and tissues will each be individually bagged in a two gallon ziploc bag. All these sample bags are placed in one large garbage bag along with the specimen label from the bottom of the data form. The specimen bag and the data form are placed in a freezer without sub-sampling, the technician contacts Vicki or the ANHSC when a full shipment has accumulated, and then sends the samples to Kodiak or Anchorage.

Step 2. Vicki Vanek receives samples in Anchorage and stores them at ADF&G or receives them in Kodiak and stores them at the Fisheries Technology Center. Periodic sub-sampling efforts occur as depicted in Figure. 1. Subsamples from each seal are repackaged into individual bags and labeled, specifying organ and origin; tied securely, refrozen, and shipped to the appropriate laboratory (see Fig. 1).

4. Data collection.

Data are recorded on forms which allow for standardization of data with other harvest-sampling programs. Presently (through mid FY98), these forms have been supplied in paper copies only. An objective for FY98 is the development of an electronic version of this form, as recommended during the EVOS scientific review committee's review of this project. Sample label and freezer log forms have been developed to assure adequate sample tracking. Each animal receives a unique number that is tied to the UAF Museum Archive numbering system. The number is assigned before any subsampling occurs so all parts are linked to the appropriate animal and can be easily tracked.

5. Sample analysis.

Figure 1 provides a summary of the research programs involved in the tissue analysis. It is expected that participating scientists will acknowledge in any reports and publications the role of the ANHSC in facilitating the biological sampling program. In FY98, an agreement form is being developed which participating researchers will sign to agree to return the results of their analysis for inclusion in databases and to acknowledge the assistance of the ANHSC.

6. Data management and reporting

Biological data collected from this program are managed and maintained in a data base using Microsoft Excel software that is easily translated or integrated with software used by other agencies and organizations. This database is centrally maintained by ADF&G and a summary of the samples collected and analyzed will be included in the project's annual and final reports to the Trustee Council, with copies to pertinent agencies, such as NMFS. Additionally, ADF&G (Vanek) will collate the results of the sample analysis into a readily understandable newsletter, that will be provided to all the project participants.

In FY98, steps are being taken to enhance this database, as recommended by the EVOS scientific review committee, and these initiatives will continue in FY 99. These include:

a. Development of an electronic data form (see above). This will facilitate communication of information and incorporation of sample data into databases.
b. Enhance UAF Museum database for back-up tracking, to include information on the biosampled seals, such as the names of researchers who received samples and identification of the sample with this program
c. Development of an electronic form that summarizes all information from samples from a particular animal
d. Development of a biannual biosample status report. Presently (mid-FY98) there is no automatic system in place for researchers to return the results of their analyses or to update other participants on their activities and progress. This will be an electronic form to be submitted every six months by each researcher who receives biosamples from this project.
e. Assisting the Youth Area Watch Program in developing a curriculum that incorporates biosample collection and study results. This will initially include developing a limited set of classroom lessons that illustrate the application of length, weight, sex, location, timing, and stomach content data.

Summary: Proposed responsibilities of each cooperating group for Objectives 1 and 2:

Vicki Vanek of the Alaska Department of Fish and Game, Division of Subsistence will:

1. Compile protocols, develop data forms and sampling kits, and incorporate instructions for their use into a training program (this was completed in FY 96; appropriate revisions will take place in FY 99); make appropriate revisions to the instruction manual.
2. Help answer community facilitators' questions
3. Train new community assistants (replacements) if necessary, in local communities or in training workshops.
4. Receive samples from village-based technicians, process samples, and ship samples to participating researchers for analysis
5. Maintain the database of biological data
6. Collate the results of the sample analysis into a readily understandable newsletter.
7. Write a brief summary of the project for inclusion in the interim and final reports for the Trustee Council
8. Participate in the Alaska Native Harbor Seal Commission workshop
9. Provide technical support for Youth Area Watch school curriculum
10. Develop and maintain electronic exchange of information with researchers, including providing data forms to researchers and researchers' subsample status and results (from biannual reports) for annual reports and reports prepared by the ANHSC.

The Alaska Native Harbor Seal Commission will:

1. Identify and subcontract with 9 community technicians
2. Purchase sampling kits and distribute kits and other supplies to village-based technicians
3. Set up air freight accounts for shipping samples
4. Receive samples from Prince William Sound biosamplers, in Cordova and prepare for shipping to Anchorage for subsampling and distribution.
5. Communicate study findings through workshops, community meetings, and the production of two workshop summaries

Objectives 3, 4, and 5: Communications, Recommendations, and Evaluation

Communication of study findings, development of recommendations for hunters, project evaluation, and development of a long-term funding plan, are part of a collaborative effort met in part through a contract with the ANHSC, which will do the following:

1. Organize one, two-day workshop to be held in conjunction with meetings of the ANHSC. Because the ANHSC is limited to one representative from each region which uses harbor seals (southeast Alaska, the Chugach Region, Cook Inlet, Kodiak, Bristol Bay, and Aleutian/Pribilofs), participation in the workshop will be expanded to include hunters from spill area communities. This workshop will be modeled after those held under Projects 94244, 95244, 96244, 97244, and 98244, which involved review of information by scientists and subsistence hunters. A goal of the workshop is discussion of potential recommendations for subsistence hunters concerning how they can support efforts to restore harbor seal

populations. The workshop is a critical component of the collaborative approach upon which the biosampling program is based.
2. Hold community meetings in selected communities involved in the biological sampling project, during which subsistence hunters and project personnel review data, traditional knowledge is applied, and any recommendations developed at the workshops are discussed.
3. Writing and distribute a workshop summary which provides overviews of findings from harbor seal research and ANHSC activities.
4. Participate in the Trustee Council restoration workshop and contribute to Trustee Council's annual and final reports

The Division of Subsistence will provide technical assistance to the Commission as needed. The goals of these objectives are also addressed through the development and maintenance of databases, as discussed above.

Annual and final reports: the Division of Subsistence will prepare annual and final reports for the project overall, with contributions from the collaborating groups.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

A. In FY 96, FY 97, and FY 98, a contract was developed with the Alaska Native Harbor Seal Commission to undertake portions of the project. This contract will be amended to include the objectives for FY 99. Tasks for the ANHSC under this contract will include:

1. Purchase sampling kits and distribute kits and other supplies to village-based technicians
2. Set up air freight accounts for shipping samples
3. Identify and subcontract with local community technicians
4. Organize and participate in community meetings in selected communities involved in the biological sampling program
5. Prepare brief (letter format) quarterly reports on its activities as related to this project.
6. Attend the Trustee Council Restoration Workshop and contribute to Trustee Council's annual and final reports
7. Organize a two-day workshop during which, among other things, this project's performance and findings will be evaluated. This will include making all travel arrangements. The workshop will include hunters from the communities involved in the biological sampling program.
8. Prepare a workshop proceedings summary report

Through subcontracts with the ANHSC, community technicians in 9 communities (Cordova, Tatitlek, Chenega Bay, Valdez, Seldovia, Port Graham, Nanwalek, Akhiok and Old Harbor) will do the following:

1. Attend one day training session (if newly hired in FY 99)
2. Collect samples (stomach contents, female reproductive organs, liver, heart, kidney, claws, head)
3. Record information about harvest locations, sex, evidence of tags or markers, length, and girth
4. Label and freeze samples, notify Vicki Vanek or the ANHSC when freezers are full, and load and ship coolers with samples to Kodiak or Anchorage

Contract A: Budget

Personnel	Executive Director for 12.0 months @ $2,000/month	$24,000
	(note: works half-time on this project)	
Travel	Executive Director travel and	
	travel for workshop participants	8,300
Operational costs		
phone		2,400
mailing	1,200	
Insurance		1,200
Sampling and freezer supplies, freezer electricity, shipping		4,700
Subcontract, village-based technicians		4,400
15% indirect program cost		6,900
Total		$53,100

Note: in kind contributions for the operations of the ANHSC technical assistance from the Chugach Regional Resources Commission (Anchorage), the Alaska Sea Otter Commission (Fairbanks), and the Indigenous Peoples' Council on Marine Mammals (Anchorage).

Subcontract: Village-based Technicians

Training honorarium: $100/day for three new technicians for one day each: $300	
Compensation for taking biological samples of seals	4,050
Total	4,350

Note: it is anticipated that samples will be taken from an average of 10 seals per community, for a total of 90 seals, and that it will take about 3 hours per seal to take samples, store samples, and ship samples. At a rate of $15/hour, this gives: $15 x 3 hours x 10 seals x 9 communities = $4,550.

SCHEDULE

A. Measurable Project Tasks for FY 99

Start-up to October 15:	Update contract with the Alaska Native Harbor Seal Commission; hire technicians
October/November:	Hold training sessions for biological sampling for new community technicians
December to September 1999:	Biological sample collection

February/March 1999:	Two-day Workshop (Alaska Native Harbor Seal Commission):
March/April 1999:	Produce and distribute proceedings report (Alaska Native Harbor Seal Commission)
September 1999:	Evaluate fourth year of program

B. Project Milestones and Endpoints

1. Development of sampling program: October/November 1995
2. Production and distribution of Instructional video: March 1996
3. Workshops to train local hunters and technicians in collection procedures: October/November 1995
4. Workshop in conjunction with meeting of Alaska Native Harbor Seal Commission: March 1996
5. Produce and distribute first proceedings report: April 1996
6. Maximize coordination with other programs: ongoing
7. Ship samples to appropriate laboratories for subsequent analysis: ongoing
8. Advise villages and scientists of analytical results when available: ongoing
9. Conduct interviews with hunters to collect traditional knowledge: ongoing
10. Second workshop in conjunction with Commission meeting: September 1996
11. Produce and distribute second proceedings report: September 1996
12. Train new village technicians and new Youth Area Watch participants: November 1996
13. Hold workshop in conjunction with ANHSC meeting: March 1997
14. Demonstrate updated Traditional Knowledge Database: March 1997
15. Produce and distribute proceeding for 1997 workshop: April 1997
16. Annual report: April 15, 1997
17. Complete map database and report: June 1997
18. Evaluate the program's effectiveness and develop a more long-term funding plan: September 1997 and September 1998
19. Train new Youth Area Watch participants -- October 1997
20. Hold workshop in conjunction with ANHSC meeting: March 1998
21. Produce and distribute proceedings for 1998 workshop: April 1998
22. Develop electronic forms for researcher exchange of information and system to transmit forms, assist UAF Museum to add tracking information to computer programs as a backup to main database; assist in Youth Area Watch curriculum development
23. Annual report: September 30, 1998
24. Train new community technicians and new Youth Area Watch participants: October/November 1998
25. Hold workshop in conjunction with ANHSC meeting: March 1999
26. Produce and distribute proceeding for 1999 workshop: April 1999
27. Annual or final report: September 30, 1999

C. Completion Date

This project should continue as long as the Marine Mammal Ecosystem Research package is underway. Presently, fieldwork and data analysis for several marine mammal restoration projects are continuing into FY 99, including \064 (Harbor Seals: Monitoring and Field Research) and \341 (Harbor Seals: Health and Diet). The former project is expected to continue until at least

FY 2000; the latter project will enter into its second year, and is expected to last a total of four years. Samples collected as part of this project are a key part of these research efforts.

PUBLICATIONS AND REPORTS

Annual report	April 15, 1997
Annual report	September 30, 1998
Annual or final report	September 30, 1999

PROFESSIONAL CONFERENCES

No attendance planned for FY 99.

NORMAL AGENCY MANAGEMENT

The Division of Subsistence of the Alaska Department of Fish and Game has no statutory or regulatory responsibilities for marine mammal management. Without this project, marine mammal biologists who are working on harbor seal recovery will lose a key source of biological information on this species. Trustee Council support of the activities of the Alaska Native Harbor Seal Commission has improved management of the injured harbor seal resource by facilitating communications between scientists and subsistence users and providing traditional knowledge to factor in to harbor seal studies. The ANHSC has received a congressional appropriation through the National Marine Fisheries Service to support certain administrative and operational costs, such as office space and travel to certain meetings and conferences. It is seeking funding from NMFS in accordance with provisions of the Marine Mammal Protection Act to support its long-term activities.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project incorporates data on population status, distribution and degree of recovery of harbor seals from the Marine Mammal Ecosystem study package, including restoration project numbers \001, \064, and \341. It also draws on the results of research conducted by the Division of Subsistence under a contract with the National Marine Fisheries Service to monitor subsistence harvests. The project provides information to researchers working on harbor seal restoration projects and facilitates their work with Alaska Native hunters. The project provides biological samples from subsistence-taken harbor seals to address potential health and nutritional problems that may be impeding harbor seal recovery, for projects \001, \064, and \321. Participants in the Youth Area Watch project (\210) participate in community technician training sessions and attend workshops.

Several programs exist to sample tissues from harbor seals from the spill area (see Table 2 and Fig. 1). As noted above, we will make every effort to coordinate our efforts with these programs to minimize the burden and confusion of hunters and communities, maximize logistical efficiency, collect comparable or standardized data whenever possible, and limit the likelihood of duplication

of efforts. The National Marine Fisheries Service assists with coordinating the harbor seal sampling and testing programs.

Additional funding for the operations of the Alaska Native Harbor Seal Commission received from the National Marine Fisheries Service and the U.S. Congress, and additional funding is being sought. Such funding supports more extensive activities for the Commission across the entire range of the harbor seal in Alaska. As of April 1997, a congressional appropriation to support basic commission functions (office, accounting, travel to conferences) was being administered through NMFS. The ANHSC received a Title VIII ANILCA grant to assist in the development of co-management plans.

Also, the traditional knowledge database component of this project will directly support efforts under Project Number \052 to integrate traditional knowledge of injured resources more broadly into restoration efforts and scientific studies. This will include a model for database organization and training in uses of the database. In turn, Project \052 has, among other things, developed guidelines and protocols for collecting and using traditional knowledge which will be supportive of the efforts for harbor seal restoration.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

No additions to project objectives or methods of the detailed project description submitted and approved for FY 98 are being proposed. In FY99, Vicki Vanek of the Division of Subsistence, ADF&G, will assume primary responsibility for training and handling of biosampling. In past years, a reimbursable services agreement with the University of Alaska support the involvement of Dr. Kate Wynne in these tasks as well. Dr. Wynne will continue to be available for consultation on the biosampling program and possibly to assist in some of the training sessions and the information exchange workshop.

ENVIRONMENTAL COMPLIANCE

This project is a continuation of Projects 94244, 95244, 96244, 97244, and 98244, which were classified as categorically excluded under NEPA guidelines. While this project will collect biological samples from subsistence-taken harbor seals, the sampling effort will not result in any additional takings of seals.

PROPOSED PRINCIPAL INVESTIGATORS

James A. Fall
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Monica Riedel
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Cordova, AK 99574
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FAX number: 907-424-5883
E-mail address: aksealmr@ptialaska.net

PERSONNEL

Monica Riedel, an Alaska Native resident of Cordova, is the executive director of the Alaska Native Harbor Seal Commission. Ms Riedel is responsible for the ANHSC activities under this project, including identifying and subcontracting with local village technicians, developing subcontracts, and organizing workshops and community meetings.

James Fall is the Regional Program Manager for the Division of Subsistence in Anchorage. Dr. Fall is responsible for overall project performance. He will also coordinate preparation of annual and final reports. No restoration funds are being requested for support of his time on this project.

Vicki Vanek is a Subsistence Resource Specialist with the Division of Subsistence in Kodiak. She holds a Doctor of Veterinary Medicine degree, and has worked on previous Division projects in collecting marine mammal samples and training hunters as well as on the biological sampling tasks of 96244, 97244, and 98244. She will assist hunters and community technicians in biosampling, and will train newly hired technicians. Dr. Vanek will also process biosamples. She will also prepare a newsletter which reports results of the biosampling efforts. Three months of funding is being requested for her work on this project.

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
Personnel	$7.2	$20.4						
Travel	$3.2	$3.6						
Contractual	$67.5	$54.1						
Commodities	$1.0	$1.0						
Equipment	$0.0	$0.0						
Subtotal	$78.9	$79.1						
General Administration	$5.8	$6.8						
Project Total	$84.7	$85.9		$80.0	$80.0	$80.0		
Full-time Equivalents (FTE)		0.3						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

FY 99

Prepared: 4/15/98

Project Number: 99244
Project Title: Community-based Harbor Seal Management and Biological Sampling
Agency: Alaska Department of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

FY 99 EXXON VALDEZ TR[illegible]E COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 1999
Vicki Vanek	Subsistence Resource Specialist II	16A	4.0	5.1		20.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		4.0	5.1	0.0	
					Personnel Total	$20.4

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 1999
Kodiak - Anchorage	0.2	4	12	0.1	2.0
Anchorage - Seldovia - Port Graham - Nanwalek	0.3	1	3	0.1	0.6
Anchorage - Tatitlek	0.7	1	3	0.1	1.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$3.6

FY 99

Prepared: 4/15/98

Project Number: 99244
Project Title: Community-Based Harbor Seal Management and Biological Sampling
Agency: Alaska Department of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

FY 99 EXXON VALDEZ TR[illegible]E COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:	Proposed FY 1999
4A Linkage	53.1
Air frieght for shipping samples from Anchorage and Kodiak to participating labs	1.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$54.1

Commodities Costs:	Proposed FY 1999
Shipping supplies and subsampling supples	1.0
Commodities Total	$1.0

FY 99

Prepared:4/15/98

Project Number: 99244
Project Title: Community-based Harbor Seal Management and Biological Sampling
Agency: Alaska Department of Fish and Game

FORM 3B
Contractual & Commodities DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY 99

Prepared:4/15/98

Project Number: 99244
Project Title: Community-based Harbor Seal Management and Biological Sampling
Agency: Alaska Department of Fish and Game

FORM 3B
Equipment
DETAIL

FY 99 EXXON VALDEZ TRU[illegible]E COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999						
Personnel	$24.0	$24.0						
Travel	$13.8	$8.3						
Contractual	$12.4	$12.4						
Commodities	$1.5	$1.5						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$51.7	$46.2		Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
Indirect	$7.8	$6.9						
Project Total	$59.5	$53.1		$50.0	$50.0	$50.0		
Full-time Equivalents (FTE)		6.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: indirect = 15% of program costs

FY 99

Prepared:4/15/98

Project Number: 99244
Project Title: Community-based Harbor Seal Management and Biological Sampling
Name: Alaska Native Harbor Seal Commission

FORM 4A
Non-Trustee
SUMMARY

FY 99 EXXON VALDEZ TR[illegible]E COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Personnel Costs:			Months	Monthly		Proposed
	Name	Position Description	Budgeted	Costs	Overtime	FY 1999
	Monica Riedel	Executive Director	6.0	4.0		24.0
						0.0
		Note: works half time for 12 months				0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	6.0	4.0	0.0	
					Personnel Total	$24.0

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FY 1999
	Chenega Bay - Cordova (workshop)	0.8	1	2	0.2	1.2
	Tatitlek - Cordova (workshop)	0.6	1	2	0.2	1.0
	Port Graham & Nanwalek to Cordova (workshop)	0.4	2	4	0.2	1.6
	Valdez - Cordova (workshop)	0.1	1	2	0.2	0.5
	Old Harbor to Cordova (workshop)	0.5	1	2	0.2	0.9
	Exec. Dir., Cordova to Anchorage (restoration workshop & biosampling workshop)	0.2	2	5	0.2	1.4
						0.0
	Exec. Dir., Cordova to Chenega (community meeting)	0.5	1	2	0.2	0.9
	Exec. Dir., Cordova to Port Graham (community meeting)	0.4	1	2	0.2	0.8
						0.0
						0.0
						0.0
					Travel Total	$8.3

FY 99

Prepared:4/15/98

Project Number: 99244
Project Title: Community-based Harbor Seal Management and Biological Sampling
Name: Alaska Native Harbor Seal Commission

FORM 4B
Personnel
& Travel
DETAIL

FY 99 EXXON VALDEZ TR[illegible]E COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:	Proposed FY 1999
Description	
Phone: 12 months @ 200/month	2.4
Postage: 12 months @ 100/month	1.2
Insurance	1.2
Electricity for village freezers	2.2
Subcontracts with community hunters/technicians Training honorarium: 3 replacements/$100 each = $300 Sample processing: 9 communities, 10 seals/community, $45/seal = $4,050	4.4
Shipping biological samples	1.0
Contractual Total	$12.4

Commodities Costs:	Proposed FY 1999
Description	
Purchase replacement materials for sampling kits (knives, gloves, plastic bags) (6 kits)	0.1
Purchase new sampling kits (3 kits @ 120/kit)	0.4
Supplies for shipping samples	1.0
Commodities Total	$1.5

FY 99

Prepared:4/15/98

Project Number: 99244
Project Title: Community-based Harbor Seal Management and Biological Sampling
Name: Alaska Native Harbor Seal Commission

FORM 4B
Contractual & Commodities DETAIL

FY 99 EXXON VALDEZ TR[illegible]E COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases:	Number of Units	Unit Price	Proposed FY 1999
Description			
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage:	Number of Units	
Description		

FY 99

Prepared:4/15/98

Project Number: 99244
Project Title: Community-based Harbor Seal Management and Biological Sampling
Name: Alaska Native Harbor Seal Commission

FORM 4B
Equipment
DETAIL

99247

Kametolook River Coho Salmon Subsistence Project

Project Number:	99247
Restoration Category:	General Restoration
Proposer:	Perryville Village Council
Lead Trustee Agency:	ADF&G
Cooperating Agencies:	NONE
Alaska SeaLife Center:	NO
Duration:	3rd year, 6-year project
Cost FY 99:	$20.8
Cost FY 00:	$21.1
Cost FY 01:	$21.4
Cost FY 02:	$29.5
Geographic Area:	Perryville/ Kametolook River/ Alaska Peninsula
Injured Resources/ Service	Subsistence

RECEIVED
APR 10 1998
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

ABSTRACT

Subsistence users from the remote South Alaska Peninsula Native Village of Perryville have noted declines in the coho salmon (*Oncorhynchus kisutch*) run in the nearby Kametolook River since the *Exxon Valdez* oil spill (EVOS). The Trustee Council began funding this project in Federal Fiscal Year 1997 with the intent of restoring the coho salmon run to historic levels. This project is a continuation of an evaluative phase of the project funded through the EVOS criminal settlement (Grant Agreement Number 2168588). Although limnological, juvenile and adult fisheries data were not available or severely limited before the salmon decline, it was determined through the evaluation phase that instream incubation boxes in conjunction with self imposed harvest limits by subsistence users were the preferred alternatives for restoration this salmon run. In 1997, the Alaska Department of Fish and Game, Habitat and Restoration Division, aided the project by providing an Environmental Assessment. In 1997, a Finding of No Significant Impact was signed for NEPA compliance.

Community involvement by the villagers of Perryville is an integral part of restoring the Kametolook River coho as a subsistence resource. Presently, no regulations prohibit fishing in the Kametolook River; however, starting in 1997 the Perryville Village Council voluntarily closed the upper half of the Kametolook River to subsistence salmon fishing in order to not interfere with spawning. In addition, as part of the community involvement portion of the project the Perryville Village Council has hired local assistants who received training to assist ADF&G with fieldwork including: genetic and pathological sampling, incubation box installation, egg takes and incubation techniques, and year around monitoring of the boxes and environment. Also, an aquarium has been set up in the village school where students actively participate in incubating coho salmon from egg to fry stage and releasing the fry into the Kametolook River. In May 1997, about 125 fry from the school aquarium project were released. This project was repeated in the winter of 1997-1998.

In 1997, two production type instream incubation boxes were installed in the upper reach of the Kametolook River. These boxes replaced and were in addition to a small test incubation box that has successfully incubated eggs. In 1997, the Kametolook River coho escapement was an estimated 724 salmon, nearly four times the estimated escapement during 1996. The increased escapement is attributed to the self imposed closure of the upper river by the villagers and a commercial fishing closure in marine waters during nearly the entire coho salmon run. In 1997, several attempts to capture ripe coho salmon have generally been unsuccessful; eggs from only seven females have been deployed in the incubation boxes. To increase the egg take, next year's project will include the use of salmon holding pens to make the recovery of ripe salmon easier.

INTRODUCTION

This subsistence project is designed to restore coho salmon subsistence opportunities in the Alaska Peninsula village of Perryville. The project was initiated during community workshops held by the Subsistence Restoration Planning Team. Workshops in Perryville took place in September 1994 and May 1995. The project was subsequently endorsed by the Perryville Village Council. The project was also discussed and endorsed by the Chignik Regional Planning Team in the spring of 1995 and again in December 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries, westward region staff assigned to the Chignik and Alaska Peninsula regions and the Division of Subsistence, have been involved in the planning and development of the project. In addition, an ADF&G biologist in the Norton Sound Region has provided technical expertise regarding the use of both instream incubator boxes and recirculating water incubators, which have been successful in the Norton Sound Region. Alaska Department of Fish and Game, Division of Habitat and Restoration staff have also been involved with the project, especially with the development of an Environmental Assessment

In 1996, funding for the evaluation phase of the project was provided through a grant to the Native Village of Perryville by the Alaska Department of Community and Regional Affairs, using EVOS criminal settlement funds. During consultation about this grant, the State members of the Trustee Council requested that a proposal to the full Trustee Council be prepared to support the implementation of the project in subsequent years. This was accomplished and the Trustee Council began funding this project in Federal Fiscal Year 1997. The Environmental Assessment was approved and the resulting FONSI for this project was received by the Trustee Council in May, 1997.

It has been determined by the assessment team (PI's, Habitat and Restoration, and Perryville Village Council) that local salmon stock instream incubator boxes are the best method to help restore Kametolook River coho salmon runs. Applications for ADF&G fish transport permits are reviewed annually and a general habitat waterway/waterbody application has been granted for this project. In 1997, an environmental assessment was completed with a Finding of No Significant Impact signed for NEPA compliance. Samples of adult coho salmon will continue to be collected for genetic and pathology data until sufficient numbers are obtained. The assessment team will work with the Principal Geneticist, Principal Pathologist and Area Management Biologist to have the most safe and satisfactory project possible to help restore coho salmon in the Kametolook River to historic levels.

NEED FOR THE PROJECT

A. Statement of Problem

Since Perryville was founded in 1912, the Kametolook River has provided the community with much of its supply of subsistence coho salmon. Since the *Exxon Valdez* oil spill,

Perryville residents have noted that there are fewer and fewer coho salmon in the river. It has become such a problem that many families must travel further away from Perryville to find sufficient amounts of salmon. Their use of these other areas has put additional pressure on fish stocks used for subsistence by the neighboring villages of Ivanof Bay, and the three Chignik villages.

Salmon are very important for Native people of Perryville, and are relied on greatly for their subsistence as well as economic livelihoods. Commercial fishing is the mainstay of Perryville's cash economy, where many residents travel to fish camps in Chignik Lagoon and Chignik Bay in the summer months to commercial fish, as well as to put up fresh sockeye salmon for smoking, canning or freezing. Those people who spend summer months in Chignik return to Perryville in the fall to put up coho salmon that are also smoked, as well as dried. Many other Perryville residents, however, do not commercial fish and stay in Perryville year around. Gradually throughout the summer, they travel to the Kametolook River to catch their year's supply of subsistence salmon which are primarily coho, pink, and chum salmon. (Sockeye, estimated at fewer than 100 adults annually, also spawn in the Kametolook River.)

Division of Subsistence personnel first did research in Perryville in 1984. Starting in 1990, the division has documented concerns by local residents that coho salmon availability in the Kametolook River is far below historical levels. Fish and Game biologists working in the Chignik region believe coho salmon stocks in the Kametolook River might be depressed, but have little data regarding historic or present escapement levels for this small, remote river.

B. Rationale/Link to Restoration

Salmon runs to the Kametolook River have been declining in recent years. Members of the village of Perryville requested the EVOS Trustee Council to fund a restoration project and they asked ADF&G to assist with this project. The cause of the decline in salmon numbers is unknown. A restoration project cannot be successful unless the cause of the decline is understood and the project is "fixing" the "right problem". An appropriate salmon restoration project will hopefully increase Kametolook River coho salmon relied on for subsistence by Perryville people back to historic levels. If more fish are available for subsistence, it will not only provide people with more coho salmon, but it will also take pressure off of other subsistence resources that were hurt by the spill, such as other salmon species, clams, seals and sea lions, as well as recent declines of local caribou.

C. Location

The remote Native village of Perryville is located approximately 500 air miles southwest of Anchorage on the Pacific side of the Alaska Peninsula. Veniaminof Volcano overlooks the village that is situated directly along the Pacific Ocean coastline with beaches of volcanic black sand. The Kametolook River is located four miles northeast of Perryville, and is easily accessible from the community via ATV, foot, or boat.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

The Trustee Council's goal of achieving additional local public involvement in the restoration process is addressed in that Perryville will be a partner with ADF&G personnel in this project. This project has been discussed and endorsed by the Chignik Regional Planing Team and the Perryville Village Council. Through project funds, the Perryville Village Council is responsible for hiring local assistants, and providing necessary logistical support for the operation of this project. The community has also contributed much in terms of local knowledge of the environment, including: historic to contemporary salmon run timing and numbers, subsistence harvest levels over time, identifying physical changes to the Kametolook River over time, helping ADF&G identify spawning and rearing areas, and identify potential characteristics of the river, such as where winter freeze over or spring and fall flooding might occur.

Several residents of Perryville have worked with ADF&G during assessment and implementation phases of the project. In addition, local assistants will monitor the project throughout the year, when ADF&G personnel will not be present. Local assistants through hands-on involvement have been trained by ADF&G personnel to monitor temperature and water level stations, to monitor the egg incubation boxes, participate in egg takes for seeding the incubation boxes, transporting eggs to the classroom incubator, and will transport fry to nearby lakes or adjacent rivers (depending on what the current review of the Fish Transport Permits allows).

Perryville residents have been kept informed about the progress of the project through the Village Council and village meetings. During these meetings residents have been informed about salmon run strengths, harvest levels, and rearing and habitat issues. The community has been encouraged to come up with ways that they can contribute toward restoring the coho run. Presently, no regulations prohibit fishing in the Kametolook River; however, starting in 1997 the Perryville Village Council voluntarily closed the upper half of the Kametolook River to subsistence salmon fishing in order to not interfere with spawning.

School children have had opportunities to learn, understand and appreciate the complexities of the growth cycle of salmon through the use of a classroom aquarium that is raising coho salmon from egg to fry stages. If the fish resource permits allow, these fry will be released into one of the two landlocked lakes or into the Kametolook River. In addition, when allowed by the teachers and parents, older school children have accompanied ADF&G personnel to the Kametolook River and nearby lakes to assist with minnow trapping and biological and habitat sampling. This portion of the project has been in operation for two winters now, and expected to continue through 2002 and possibly beyond if the school continues to support the program.

PROJECT DESIGN

The primary goals of the project are to increase the coho salmon runs to the Kametolook River and to include the people of Perryville through involvement in the project and education. The method(s) used to accomplish this have been determined in 1996 and 1997 by a team of ADF&G specialists, and local Perryville residents. Funding for the first portion of the project was provided through a grant to the Native Village of Perryville from the criminal settlement funds. Beginning in Federal Fiscal Year 1997 funding has been provided by the Trustee Council. Personnel involved with the project have determined that the most appropriate rehabilitation method is through the use of instream incubation boxes. The team has acquired all the necessary permits (with the exception of the Fish Transport Permits which are submitted to ADF&G for review annually). The Environmental Assessment and a Finding of No Significant Impact by the US Fish and Wildlife Service was approved in May of 1997. This project has the potential to make restoration of coho salmon in the Kametolook River possible. Similar projects in other regions of Alaska have proven to be successful.

In addition to school and village meetings where salmon life cycle processes were described instream incubation boxes have been determined to be the preferred restoration method. A test incubation box was positioned in a head water tributary of the Kametolook River to use the natural flow of water from the stream to incubate coho salmon eggs. This portion of the project has been successful; swimup fry were produced during April, 1997. In the production phase of this project, genetic integrity of the Kametolook River coho salmon will be assured under the guidance of the department's Principal Geneticist. The potential incubation site has water temperatures consistent with natural spawning sites to insure that fry development and emergence occur at the same time as naturally occurring fry. The small scope of this project is not expected to noticeably add any coho salmon to other common property harvest groups (i.e. commercial fisheries).

From similar projects in Norton Sound, it has been found that improved returns were noticeable in about five years. If the number of coho salmon spawners is sufficient to allow an egg take, instream incubators will be employed. (Fish Transport Permits will require a minimum of 60 naturally spawning pairs before an egg take can occur and then 50% of the escapement above the 60 spawning pairs will be available for an egg take.) In 1998 and beyond, the use of salmon holding pens will be used to make the recovery of ripe salmon easier. The incubators are expected to operate annually from 1997 through 2002. Since a major expense is in the boxes (materials and installation), and establishing an incubation site, the annual cost of operation and maintenance is not significant.

Other restoration methods evaluated included a recirculating water incubation facility in the village, potential habitat manipulation to create or provide access to better spawning and rearing habitats, and a remote incubation facility. All of these alternative methods were rejected in favor of the instream incubators.

A. Objectives

There are two main project objectives: the first is community involvement described above, and the second is to restore the coho salmon returns to the Kametolook River and provide local subsistence salmon opportunities. The species of interest for this project is coho salmon. Phase 1 of the project included a complete assessment of the creek and river habitat in proximity to Perryville and interviews to determine salmon run strength, run timing and physical changes to local drainages. Phase 2 (1996) included installation and testing of a streamside incubation box, continuation of the classroom aquarium and education programs for adults and high school students. Phase 3 so far has included installation (August/September 1997) of large capacity streamside incubation boxes, installation and use of the school aquarium, education programs, and biological sampling for pathological and genetic testing. Phase 3 will continue through the end of the project with biological testing (until required amount necessary are obtained for genetic and pathology tests), annual egg takes for the incubation boxes and the school aquarium, continued education and habitat and harvest monitoring.

B. Methods/ May 1996-September 1998

May 1996 through September 1996/ This phase of the project was funded through the Criminal Settlement/ Project Perryville 96-1.

May 1996: Three ADF&G assessment team members traveled to Perryville and joined with local assistants to assess the Kametolook River in order to make recommendations for the best restoration efforts. A small instream test incubator box (2 foot square plywood box) was installed at the headwaters of the river. The incubator box was also equipped with a thermograph to aid in determining the potential of the incubation site. Thermographs were also installed at three other habitat monitoring locations along the Kametolook River. Perryville guides showed the ADF&g team the different stream reaches; at this time, there was no evidence of blockages to adult or smolt migration. Blockage and breaching events apparently occur on a scale of about 2-10 years. ADF&G personnel were given the impression that the river has relatively unstable spawning areas with current upstream spawning sites improved from prior years. Young-of-the-year and fingerling coho were observed in several slough habitats and small ponds. Several ponds, deep main-stem pools, side-channel sloughs and spring areas apparently do not freeze solid and would provide over winter rearing habitat. During this trip preliminary investigations were also undertaken for possible stocking of rainbow trout or coho salmon into two landlocked lakes (Sandy and Sicken Lakes) in proximity to Perryville. At the high school ADF&G personnel discussed potential education projects such as a classroom salmon aquarium and recirculating egg incubators. (A detailed field trip report is available.)

Project 97247 (October 96-September 97)

October 1996: Three ADF&G assessment team members traveled to Perryville and joined with local assistants to expand the habitat surveys of drainages adjacent to Perryville, to place fertilized eggs in the experimental stream side incubation box and to initiate a cooperative educational program in the Perryville school. Local guides showed us much of the historic and potentially productive reaches of the Kametolook, Three Star and Long Beach Rivers. Long Beach River, although historically productive, presently had no quality spawning or rearing habitat. Three Star River, smallest of the three drainages, had some stable reaches but about half of the discharge had changed course and currently flows into Long Beach River. Some potential rearing habitat is present while spawning habitat appeared to be limited. Kametolook River currently showed the most salmon spawning and rearing potential. However, this system is dynamic and habitat quantity and quality may change annually.

Minnow trapping was conducted in all three drainages. Rearing and spawning habitat in Long Beach River appeared to be negligible. Three Star River had limited high quality slough habitat and supported juvenile coho salmon and Dolly Varden; spawning habitat appeared to be limited to several short stream reaches. Rearing habitat for juvenile coho salmon in the Kametolook River appeared to be quite abundant while upper stream reaches seemed able to support relatively good numbers of spawning salmon. Several high school students assisted with coho fingerling data collection efforts.

Trap catches and age-classes of juvenile coho salmon are summarized below:

			Total	Catch per Trap-Hour	
Location	Site	No. Traps	Trap Hr.	Coho	Dolly Varden
Kametolook	Candlefish Slough	4	2.50	36.1	150.5
Kametolook	Fingerling Slough	5	5.40	44.6	10.5
Kametolook	Cross Creek	4	2.16	19.9	34.0
Kametolook	Average			33.4	58.9
Three Star	"Lake"	2	9.09	5.2	16.1
Long Beach	pond	1	0.50	8.0	

Fingerling coho salmon age classes from the Kametolook River-combined:

	Number	Percent
Age 1.0:	45	45.0
Age 2.0:	55	55.0
Total Samples:	100	100.0

A total of 32 adult coho salmon were collected from the Kametolook River during this trip. Few other adult salmon were seen. Genetic and kidney samples, otoliths and scales

were taken from each salmon. All observed coho salmon appeared to be recent arrivals to the river and were not ripe; seeding fertilized coho eggs into the incubation box was not possible.

Age class distribution of adult coho salmon from the Kametolook River is as follows:

	Number	Percent
Age 1.1:	9	28.1
Age 2.1:	18	56.3
Age 3.1:	2	6.3
Unknown:	3	9.4
Total Samples:	32	100.0

Adult coho samples from the Kametolook River, sexed from internal observation:

	Male	Female	Unknown	Total
Number	15	16	1	32
Percent	46.9	50.0	3.1	100.0

High school students, in addition to assisting with fingerling sampling, also explained the field trip experience to their fellow students. Each presented some aspect of the field studies and the ADF&G team participated by asking questions and explaining details. ADF&G personnel also demonstrated scale reading techniques and presented representative samples of all species collected from the minnow traps. Plans were developed with the science teacher to install and permit a classroom aquarium incubator for coho salmon eggs. (A detailed field trip report is available.)

November 1996: Two ADF&G assessment team members traveled to Perryville and joined with local assistants to capture and spawn one pair of coho salmon for the incubation box in the Kametolook River. Gillnetting captured about 20 salmon including 4 sockeye, 13 male coho and 3 female coho salmon. Following standard delayed fertilization techniques, the eggs were fertilized and seeded into the incubation box. A thermograph was deployed in the substrate near the largest group of spawning salmon. Although only a one time event, a survey to enumerate spawning coho was conducted. About 75% of all observed coho were located within 1 mile downstream of the incubation box; the remaining 25% were scattered in small groups throughout the remainder of the drainage. The total observed coho escapement was about 100 salmon with no ocean bright salmon observed. The subsistence harvest continued, and the observed escapement might have been higher than the actual spawning escapement. (A detailed field trip report is available.)

At the high school the ADF&G team assembled the aquarium incubator. When the eggs reach the eyed stage, about 250 eggs from the stream side incubator were transferred to the classroom incubator (January ADF&G field trip). (A detailed field trip report is available.)

January 1997: Two ADF&G team members traveled to Perryville. While waiting in King Salmon for the flight to Perryville they met with the Alaska Peninsula/Becharoff National Wildlife Refuge staff to discuss the Kametolook project and review the draft Environmental Assessment. In Perryville, they joined local assistants and checked the thermograph and staff gauge sites, shocked the incubating eggs, discarding dead eggs, and sorted out about 250 eggs which were transported to the school aquarium. An approved Fish Transport Permit allowed 250 eggs to be raised in the school aquarium and their release back into the Kametolook River. With the assistance of five high school students the team measured physical characteristics of two landlocked lakes as potential coho fry or rainbow trout release sites and collected gravel for alevin habitat in the aquarium. A slide show of the restoration project and discussion of the life cycle of salmon was presented to all Perryville students. ADF&g personnel also attended a meeting sponsored by the Village Council where they presented a similar slide show. At the village meeting the restoration project and the school aquarium were discussed as well as the life cycle of coho salmon, the 1996 coho salmon escapement, and potential production from the escapement. (A detailed field trip report is available.)

March-May 1997: ADF&G personnel drafted an Environmental Assessment of the Kametolook River Coho Salmon Restoration Project. A FONSI was developed and in May was signed for NEPA compliance. A Habitat Permit was reviewed and accepted which allows the instream incubation boxes to be deployed. Fish Transport Permits were drafted for review to insure that management, genetic, and pathology concerns are addressed. Approximately 125 coho salmon fry were released into the river of origin (Kametolook) from the school aquarium project (Fish Resource Permit P-97-021).

June-July, 1997: Received appropriate fish transport permits from ADF&G for harvesting salmon eggs and releasing fry from incubation box and school aquarium for the 1997/98 season. Purchased materials for two incubation boxes and constructed them for later use. Met with the Chignik Regional Planning Team, Chignik Regional Aquaculture Association and public to development a Western and Perryville Districts coho salmon management plan.

August 1997: Transported incubation boxes to Chignik Bay (ADF&G M/V Resolution) and local Perryville resident transported them to Perryville via fishing boat.

September 1997: Two Perryville personnel were trained (2 weeks) at Pillar Creek Hatchery (Kodiak) in spawning and incubator maintenance techniques. Two ADF&G staff attempted to travel to Perryville to install the two incubation boxes in Kametolook River, sample salmon and trout for age, length and abundance data, however weather prevented them from traveling beyond Chignik Lake. In late September, two Perryville assistants transported two egg boxes and other necessary equipment up Kametolook River to the installation site.

Project 98247 (October 97-September 98)

October-November 1997: The Perryville Village Council voluntarily closed the spawning areas of the Kametolook River to fishing (October 3). One ADF&G personnel traveled to Perryville October 31 through Nov. 6. On this trip ADF&G personnel 1) set up the school aquarium for incubation of coho salmon from egg to fry stages, met with the teachers and this year's upper class members and instructed them on classroom salmon incubation techniques; 2) discussed with the local assistants the placement of thermographs for the fall/winter/spring period of 1997-1998; 3) estimated the total coho salmon escapement to the Kametolook and Three Star Rivers; 4) with help of three local assistants, installed two production type salmon incubation boxes in the Kametolook River; 4) attempted a coho salmon eggtake for the incubator boxes and the school aquarium 5) took samples of adult coho salmon for genetic and pathology data. Only two ripe and no spawned out fish were caught and added to one of the egg incubation boxes. Because of the lack of success finding ripe and spawned out salmon, it was decided that four local Perryville assistants would attempt additional egg takes through November.

Local Perryville assistants took 10 additional trips at different stream locations and several sets per day to capture ripe coho for the incubation boxes without much success totaling 7 females, which were added to the incubation boxes. The problem was not in catching fish, but in catching ripe ones. Samples were taken for pathology and genetic testing from males and females harvested for sampling. They reinstalled and deployed thermographs at designated sites.

December 1997: The assessment team decided to install fish holding pens in 1998 to aid in capturing ripe salmon for egg incubation boxes. Perryville assistants traveled to egg incubation boxes and removed approximately 300 eyed eggs which were put inside the school aquarium.

January-March 1998: Perryville assistants took monthly monitoring trips to Kametolook River to check thermograph sites and egg boxes. Approval to release fry in Kametolook was denied by ADF&G Pathologist due to low number of females harvested; however, approved was granted to release them in local landlocked Sicken and Sandy Lakes in late April or May. The Perryville teacher communicated with ADF&G regarding status of eggs in aquarium. Survival fry from school incubation box will be transported and released in the Kametolook River in late April or May. Two net holding pens were acquired, and prepared for transport to Perryville in May. Present staff attended the State Board of Fisheries meeting and gave staff report regarding the project. They also attended Chignik RPT meeting and provided a project status report. The RPT continued to support project. A fish transport permit request was submitted to ADF&G for review.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

Perryville

The Native Village of Perryville has hired a local project administrator to track the project, arrange for logistical support, and assist ADF&G with field work and long term monitoring of the project. Three additional Perryville residents have been hired (by the

Village) to work annually, as needed, to assist ADF&G and the project administrator with building and hauling materials, maintenance of installed egg boxes, site selection and installation of fish holding nets. Local assistants will also help with capturing adult salmon, taking genetic and pathology samples, removing, fertilizing, and seeding eggs into incubation boxes, and releasing fry in spring. Village assistants will also need to continue providing a skiff and 4-wheelers as needed. The project administrator is responsible for checking the boxes and habitat monitoring sites throughout the winter to insure they are operating efficiently, and safe from natural or human harm. Wages for the four village assistants have been included in the cost of the grant.

Alaska Department of Fish and Game

Several ADF&G personnel have provided technical assistance for the project. Personnel responsible for the project include: Jim McCullough, Fish Biologist III for Commercial Fisheries, Kodiak, and Lisa Scarbrough, Subsistence Resource Specialist II for Subsistence, Anchorage. Personnel assisting the project include: Bill Hauser, Fish Biologist IV for Habitat and Restoration, Anchorage; Joe Sullivan, Fish Biologist III for Habitat and Restoration, Anchorage, Dave Owen, Fish Biologist III, Chignik/Kodiak; Wayne Dolezal, Habitat Biologist III for Habitat and Restoration, Anchorage and Pete Velsco, Fish Culturist II for Commercial Fisheries, Nome (earlier in project/now retired).

Jim McCullough with ADF&G has several years of varied experience with fisheries enhancement and research projects as well as salmon management in the Alaska Peninsula. Lisa Scarbrough, has been doing subsistence research in the Alaska Peninsula (including Perryville) communities since 1989. Bill Hauser and Joe Sullivan have extensive experience in fisheries restoration and enhancement with the department. Dave Owen is Chignik's Area Management Biologist with several years of experience with fisheries in the Chignik/ Perryville region. Wayne Dolezal is one of the State's leading experts on habitat restoration. Pete has several years of varied experience with instream and recirculating incubation box projects, particularly in Norton Sound. Labor (with the exception of .5 months/year for Lisa) will be provided by ADF&G as part of their normal salary, however, transportation costs and per diem will be covered through the grant.

SCHEDULE

A.1. Measurable Project Tasks remaining for FY 98 (April- September 1998)

April/May 1998:
- -Review meeting with assessment team to evaluate the project.
- -Write DPD proposal for FY99 and FY 97 annual report.
- -One ADF&G personnel travels to Perryville to assist Perryville assistants with fry release from egg boxes. Students release aquarium fry. Meet with community to review status of project and discuss community involvement activities.
- -Ship net holding pens and attachments to Perryville.
- -Perryville assistants monitor monthly thermograph and incubation boxes.

June-Sept. 1998: -Perryville assistants monitor monthly thermograph and incubation boxes, and conduct stream surveys.

A.2. Measurable Project Tasks for FY99 (October 1998 - September 1999)

October 1998:
-One ADF&G personnel travel to Perryville to install salmon net holding pens and seine coho salmon (assisted by 2 or 3 Perryville assistants) to keep in pens until salmon are ripe for spawning.
-ADF&G conducts stream surveys of Kametolook River.

Nov./Dec. 1998:
-Two ADF&G personnel travel to Perryville:
- meet with Perryville personnel and conduct escapement surveys.
-Perform a coho salmon egg take.
-Sample salmon for genetic and pathology tests.
-Consult with teachers and set up school aquarium and obtain FTP.

Jan.-Feb. 1999:
-Perryville personnel will transport eyed eggs to the school aquarium.
-ADF&G analyze subsistence and commercial harvest data.
-Attend Chignik State Board of Fish meeting.
-Attend Chignik RPT meeting and provide project status report.
-Submit Fish Transport Permit request to ADF&G for review.

April/May 1999:
-Review meeting with assessment team to evaluate the project.
-Write DPD proposal for FY00 and FY 98 annual report.
-One ADF&G personnel travels to Perryville to assist Perryville assistants with fry release from egg boxes. Students release aquarium fry. Meet with community to review status of project and discuss community involvement activities.
-Purchase and ship to Perryville any necessary equipment needed for project maintenance.
-Perryville assistants monitor monthly thermograph and incubation boxes.

June-Sept. 1999:
-Perryville assistants monitor monthly thermograph and incubation boxes, and conduct stream surveys.

B. Project Milestones and Endpoints

Annually through the duration of the project: One day every month, one or two trained Perryville researchers will return to the thermometer sites and note the condition of the thermographs and photograph the area. They will also be responsible for reporting their findings to the ADF&G team. ADF&G will continue to supervise the project and continue to take trips to assist with the project; however, as the project continues (up

through 2003) Now that Perryville assistants have been trained by ADF&G, they will take on more responsibility for the project, including but not limited to: conducting escapement surveys, netting salmon for holding in pens, harvesting and fertilizing eggs and transporting to egg boxes, taking samples of harvested salmon for genetic and pathology tests, assisting school children with obtaining eyed eggs for school aquarium project, and releasing fry in spring. (This is necessary because of budget constraints preventing ADF&G from being present at all critical times of the project.)

Annually, ADF&G staff will evaluate the Kametolook coho runs through subsistence harvest reports, evaluate incubator performance and stocking levels, perform egg takes, stocking, update project plan, review FTPs and FRPs, provide annual peer review and write annual reports. ADF&G biologists will determine any significant changes to the coho salmon spawning and rearing habitat of the rivers to determine appropriate stocking levels. ADF&G will also evaluate the use of Kametolook River coho salmon as brood stock and the release of fry back into the Kametolook, Three Star, and Long Beach Rivers and other potential stocking sites include Sandy and Sicken Lakes.

In order to rehabilitate the coho salmon run in the Perryville area, education of villagers through a better understanding of the life cycles and conservation of salmon is essential. The ADF&G team will assist with an educational process that focuses on teaching the community through the both the school children and adults. They plan to continue working with the community and teachers and help with this process. Results from all samples will continue to be shared with the school and community.

In conjunction with all other aspects of this project, the ADF&G team will continue to work with the Village Council to assess the project and look at ways the community can facilitate the success of the project and help increase the number of spawning coho salmon. As mentioned earlier, as of October, 1997, Perryville Village council voluntarily closed the upper half of the Kametolook River to salmon fishing as a way to do their part at helping solve the salmon shortage problem. This action as well as other options will be evaluated and discussed with the community annually on a regular basis.

The ADF&G team expects the stream side incubation boxes, in conjunction with some fishing restraints, will provide sufficient coho salmon to rehabilitate the run within two to three life cycles. In addition to the Kametolook River, coho fry from the incubation boxes and school aquarium could also be stocked in both landlocked lakes (Sandy and Sicken), as well as nearby Three Star and Long Beach Rivers (approved by ADF&G FTP reviewers).

C. Completion Date

The project is anticipated to be completed by September 30, 2002.

PUBLICATIONS AND REPORTS

An annual report of activities will be submitted to the Restoration Office before 15 April of each year, commencing in 1998. Similar reports will also be presented to the Chignik Salmon Advisory Committee and the Alaska Board of Fish.

PROFESSIONAL CONFERENCES

None planned at this time.

NORMAL AGENCY MANAGEMENT

This proposed rehabilitation effort is not part of ADF&G's normal management responsibilities in the Chignik area.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project is a continuation of Perryville 96-01, funded by DCRA funds from the EVOS Criminal Settlement in FY 96 and Trustee Council Civil projects 97247 and 98247 funded in Federal Fiscal Years 1997 and 1998.

PRINCIPAL INVESTIGATORS

Jim McCullough, Fish Biologist III
Alaska Department of Fish and Game
Division of Commercial Fisheries and Management
211 Mission Road
Kodiak, Alaska 99615-6399
Phone: (907) 486-1813
Fax: 486-1841
E-mail: JimMc@fishgame.state.ak.us

1 Nov 1995 - Present: FB III Regional Resource and Development Biologist. Co-author of the Pillar Creek and Kitoi Bay basic and annual hatchery plans. Voting member of the Kodiak, Chignik and Alaska Peninsula/Aleutian Islands Regional Planning Teams. Author/Review regional Fish Transport and Fish Resource Permits. Regional Habitat Biologist. ADF&G representative to the Kodiak Sensitive Areas Workgroup. Coleader of an EVOS project to restore a coho stock for subsistence purposes in the Chignik Area.

30 June 1990 - 1 Nov 1995: FB III Alaska Peninsula Herring and Southeastern District Salmon Management Biologist. Compiled salmon and herring catch data and herring

biomass and salmon escapement data which I analyzed to determine opening and closure of the various commercial fisheries as delegated by the Commissioner of ADF&G.

16 July 1985 - 31 May 1990: FB II Alaska Peninsula and Aleutian Islands Areas Finfish Research Biologist involved the design, organization, and completion of the annual catch and escapement program.

Lisa Scarbrough, Subsistence Resource Specialist II
Alaska Department of Fish and Game
Division of Subsistence
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Fax: 267-2450
E-mail: LisaS@fishgame.state.ak.us

Lisa Scarbrough has been a subsistence resource specialist with the Division of Subsistence of the Alaska Department of Fish and Game since 1989. She has extensive subsistence research experience in the Chignik area, including the village of Perryville. This has included research on the effects of the oil spill on local subsistence patterns. Her work has also involved training residents of the Chignik area communities as research assistants. Since 1993, Lisa has been responsible for assessing Chignik Subsistence salmon permit data.

OTHER KEY PERSONNEL

Perryville Traditional Village Council
Gerald Kosbruk, President
Celia Yagie, Village Administrator
P.O. Box 101
Perryville, Alaska 99648
Phone: (907) 853-2203
Fax: 853-2230
Chief Community Coordinator- *Jerry Yagie* - Phone: (907) 853-2261

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Phone: (907) 486-1806
Fax: 486-1841

Chignik Regional Planning Team and Chignik Regional Aquaculture Association
Chuck McCallum, Chairman
614 Irving Street
Bellingham, Washington 98225
Phone: (360) 647-5540
Fax: 733-4744

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$2.6	$2.6
Travel	$6.4	$6.8
Contractual	$4.7	$10.0
Commodities	$0.0	$0.3
Equipment	$0.5	$0.0
Subtotal	$14.2	$19.7
General Administration	$0.7	$1.1
Project Total	$14.9	$20.8
Full-time Equivalents (FTE)	0.5	0.5
Other Resources		

LONG RANGE FUNDING REQUIREMENTS					
	Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
	$21.1	$21.4	$29.5		

Dollar amounts are shown in thousands of dollars.

Comments:
Comments: An Environmental Assessment was approved in 1997. The final evaluation of the project is projected to be FY 2002.

This project was originally funded by Criminal Settlement funds in 1996. The budget estimate for 1999 through 2002 differs slightly than the projected amount stated on the 1998 DPD . This is because contractual costs with Perryville are higher than originally estimated, due to the nature of the salmon run and FTP requirements. Additional field days are required than estimated in 1989 in order to obtain sufficient eggs for the egg boxes. It is more cost effective to have local Perryville assistants conduct this extra work than to have ADF&G make several additional trips to Perryville to accomplish these tasks. (Two Perryville assistants were trained in Sept., 1997 as part of this project at the Kodiak Pillar Creek Hatchery as well as on the job training with ADF&G in Perryville on this project.) Insurance costs were added to the contractual portion of project to cover Perryville's cost for general liability and workman's compensation insurance that are required by the State of Alaska for this project. In addition, staff time (.5 months in 1999,2000,2001 and 2.0 months in 2002) will continue to be requested annually in order to develop and monitor the subcontract with Perryville and provide other staff support for the project, and write the final report in 02.

FY 99

Prepared: 4/1/98
Revised: 4/9/98, JRS

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Agency: ADFG

FORM 3A
TRUSTEE
AGENCY
SUMMARY

FY 99 EXXON VALDEZ TRU[illegible] COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 1999
Lisa Scarbrough	Subsistence Resource Spec. II	16F	0.5	5.1	0.0	2.6
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		0.5	5.1	0.0	
					Personnel Total	$2.6

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 1999
Kodiak/ Anchorage	0.4	3	6	0.1	1.8
Anchorage/Perryville	0.8	4	18	0.1	5.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$6.8

FY 99

Prepared: 4/1/98
Revised: 4/9/98, JRS

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Agency: ADFG

FORM 3B
Personnel
& Travel
DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:		Proposed
Description		FY 1999
4A Linkage	Contract with the Native Village of Perryville (Perryville wages/gasoline/ATV or boat use/ insurance/ Village Admin fee (10%))	9.8
	shipping costs of misc. maintenance supplies to Perryville via Peninsula airmail	0.2
When a non-trustee organization is used, the form 4A is required.	Contractual Total	$10.0

Commodities Costs:	Proposed
Description	FY 1999
General maintenance supplies for incubation boxes/ egg take equipment/ fish holding pens/ temperature instruments/school aquarium etc.	0.3
Commodities Total	$0.3

FY 99

Prepared: 4/1/98
Revised: 4/9/98, JRS

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Agency: ADFG

FORM 3B
Contractual & Commodities DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY 99

Prepared: 4/1/98
Revised: 4/9/98, JRS

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Agency: ADFG

FORM 3B
Equipment
DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$4.3	$5.4
Travel		$0.0
Contractual		$2.3
Commodities		$0.0
Equipment		$0.0
Subtotal	$4.3	$7.7
Indirect	$0.4	$2.1
Project Total	$4.7	$9.8
Full-time Equivalents (FTE)		0.0
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FY 2000	Estimated FY 2001	Estimated FY 2002
$10.1	$10.4	$10.7

Dollar amounts are shown in thousands of dollars.

Comments:

Perryville overhead rates are typically 10%; however ADF&G requires workman's compensation and general liability insurance for contractors. Thus indirect equals insurance ($1.3K) plus normal overhead ($0.8K).

FY 99

Prepared: 4/1/98
Revised: 4/9/98, JRS

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Name: The Native Village of Perryville

FORM 4A
Non-Trustee
SUMMARY

FY 99 EXXON VALDEZ TRU[illegible] COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FY 1999
To be determined	Project Facillitator and assistants					5.4
						0.0
Note: approx. 54 days of work @ about $100/day labor						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		0.0	0.0	0.0	
					Personnel Total	$5.4

Travel Costs:		Ticket	Round	Total	Daily	Proposed
Description		Price	Trips	Days	Per Diem	FY 1999
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$0.0

FY 99

Prepared: 4/1/98
Revised: 4/9/98, JRS

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Name: The Native Village of Perryville

FORM 4B
Personnel
& Travel
DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:	Proposed
Description	FY 1999
Note: appx. 45 days of ATV use @ about $50/day	2.3
Contractual Total	$2.3

Commodities Costs:	Proposed
Description	FY 1999
Commodities Total	$0.0

FY 99

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Name: The Native Village of Perryville

FORM 4B
Contractual & Commodities DETAIL

Prepared: 4/1/98
Revised: 4/9/98, JRS

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	

FY 99

Project Number: 99247
Project Title: Kametolook River Coho Salmon Subsistence
Name: The Native Village of Perryville

FORM 4B Equipment DETAIL

Prepared: 4/1/98
Revised: 4/9/98, JRS

Investigations of Genetically Important Conservation Units of Species Inhabiting the EVOS Area

Project Number:	99252
Restoration Category:	Research
Proposer:	ADF&G
Lead Trustee Agency:	ADF&G
Cooperating Agency:	None
Alaska SeaLife Center:	Yes
Duration:	4 years
Cost FY 99:	$ 263,500
Cost FY 00	$ 272,000
Cost FY 01	$ 281,000
Cost FY 02	$ 290,000
Geographic Area:	Resurrection Bay, Gulf of Alaska Spill Area
Injured Resource/Service:	Commercial Fishing, Rockfish

RECEIVED
APR 15 1998
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

ABSTRACT

This proposal consolidates an array of requests from the commercial fisheries industry for discrete stock research into a single proposal for work that ADF&G would conduct at its Anchorage genetics laboratory. Also, ADF&G will continue to develop experimental fish runs at the Alaska SeaLife Center. These are essential for study of genetics, physiology, or diseases of anadromous fish proposed by University of Montana, University of Alaska, or ADF&G and other principal investigators seeking to conduct research at the Seward facility.

INTRODUCTION

The commercial fishing industry in the Gulf of Alaska spill area underwent radical alterations from the impacts following the 1989 *Exxon Valdez* oil spill (EVOS). Area closures, species closures, and price fluctuations cumulatively affected both the industry and the target species. This proposal is designed to address discrete stock concerns through (1) identification of the stock structure of marine species most affected by fishery alterations including walleye pollock and several species of rockfishes; and (2) conducting experimental matings at the Alaska SeaLife Center (ASLC) to support the research and findings of other Trustee Council-funded studies.

A. Marine Fish

The understanding of the genetic structure of discrete stocks is a central feature of conservation and restoration of commercially exploited fisheries resources today. ADF&G received Trustee Council support to improve discrete stock management capabilities only within the confines of Prince William Sound and Cook Inlet through study of genetics and ecology. Yet, post-spill changes in stock dynamics and changes in fishing patterns continue to adversely affect commercially valuable marine species in the greater Gulf of Alaska (GOA) spill area. This project, designed to expand ADF&G genetics research into the greater Gulf, was developed in response to specific requests from industry and after consultation with representatives from groups including the Alaska Draggers, Alaska Groundfish Data Bank, and the North Pacific Processors.

Area closures, species closures, and price fluctuations on other species led ADF&G and the fleet to initiate the harvest of walleye pollock as a replacement species in Prince William Sound. Pollock are a major predator species in the northern GOA. Historical assessment data from Kachemak Bay in the northern GOA suggest that pollock have been a dominant fish species in the ecosystem for the past twenty years (Bill Bechtol, ADF&G Homer, personal communication). Though poorly documented, pollock also appear to be a major predator species in PWS. EVOS-funded acoustic surveys conducted by the PWS Science Center (Sound Ecosystem Assessment Project, SEA) showed that pollock are primary predators of pink salmon fry, and to a lesser extent, larval and juvenile Pacific herring and several species of phytoplankton. Pollock spawn primarily from late winter to early spring, but spawning fish may be found year-round. Although peak spawning times and locations are quite consistent within areas, the extent of spawning site fidelity is unknown. The harvest of pollock began in 1995 after the SEA surveys documented commercially viable biomass spawning within the confines of PWS.

This novel harvest of pollock within the three-mile limit of state jurisdiction developed into a controversy also because of conservation concerns; the harvest of GOA pollock is based upon sustainable quotas established through inter-jurisdictional research and negotiation. The Pacific Fisheries Management Council could add the PWS catch to the GOA quota if PWS pollock form a discrete stock. The PWS catch may need to be subtracted from the quota if discrete stocks do not exist. ADF&G is coordinating efforts with National Marine Fisheries Service to adapt stock markers for identification of discrete pollock stocks within the GOA.

Finally, during post-spill years, ADF&G documented greatly elevated effort on the sport and commercial harvest of rockfishes. Rockfishes are a diverse group of species belonging to the genus *Sebastes*. Despite the fact that they are often managed as a group, there are over thirty-two species found in Alaskan waters. Rockfish harvests increased four-fold due to closures of the commercial salmon and shellfish fisheries following the EVOS, and harvest rates have remained high in some areas. Because rockfish exhibit extreme longevity, slow growth, and late maturity, depressed populations often recover very slowly, and even with the curtailment of all human use, the impacts and rebuilding of depressed or depleted rockfish populations may continue through several human generations. The Alaska Board of Fisheries has instituted conservation restrictions, but the structure of discrete stocks is currently unknown. The critical lack of assessment information on rockfishes is also being addressed in a new proposal to the Trustee Council by ADF&G, Project 99354-*Development of habitat-based population assessment for nearshore rockfish along the northern Gulf of Alaska.*

B. Experimental Matings

Components of the genetic and ecological research implemented by the *Exxon Valdez* Trustee Council were hampered by the inability of principal investigators to conduct experimental matings with the organisms. Project 98252 funds the initiation of experimental runs at the ASLC. Opportunities now exist to conduct inheritance studies on Pacific salmon and marine fishes. Experimental matings are needed to verify inheritance of numerous novel genetic markers developed to improve discrete stock management capabilities for Pacific herring and pink and sockeye salmon through Trustee Council Projects 9x165, 9x191, 9x196, and 9x255. Additionally, continued matings with pink salmon will complete the work now underway in the project 9x190 series.

Genetic markers are also potentially available to Trustee agencies from collaborating laboratories conducting research on sister species. The markers available for identification of Atlantic cod stocks (Brooker et al., 1994) appear to be promising for the study of pollock. Similarly, markers developed for other *Sebastes* species seem to provide reliable results in black rockfish. However, use of some of these markers is hampered by the expression of null phenotypes, and mating studies are needed before data from such loci can be properly included in discrete stock studies.

NEED FOR THE PROJECT

A. Statement of Problem

Post-oil spill alteration of fishing pressure lead to escalated fishing effort on stocks of several marine species including PWS walleye pollock and rockfishes of the genus *Sebastes*. These fisheries emerged as they are today as a direct consequence of changing fishery patterns following the *Exxon Valdez* oil spill. Fishery managers trying to facilitate these emerging fisheries need to know the structure of discrete stocks in order to better manage them on a sustained basis.

Also, experimental matings are needed to support genetic and other studies of marine organisms inhabiting the spill area. During the spring and summer of 1998, ADF&G will consolidate its experimental matings at ASLC through Project 98252. Previously these studies were conducted at the Anchorage laboratory, sometimes at various hatcheries across the state of Alaska, and in five consulting laboratories in Nova Scotia, Washington, and Montana. Much of this dispersion occurred because of the paucity of wet lab and dry lab space available in the region. This ongoing consolidation of the wet-lab projects into one project at the ASLC, using the new fish pass and fish-rearing space, will increase efficiency and cost-effectiveness of the research. The Trustee Council funded project 97197 to construct the fish pass for development of experimental fish runs.

Experimental fish runs developed at the ASLC will support research from other Trustee Council projects as well as projects proposed by University of Alaska. Experimental matings of pollock, herring, pink salmon, cutthroat trout, and Dolly Varden char and other species will be invaluable for documenting the Mendelian inheritance of many of the new gene markers developed through Trustee Council studies.

B. Rationale/Link to Restoration

1. Commercial fishing (walleye pollock)

Since 1995 a commercial fishery for walleye pollock has been prosecuted in the inner waters of the Gulf of Alaska. ADF&G regulates the harvests in Prince William Sound, which have occurred primarily near Port Bainbridge and Knight Island. The National Marine Fisheries Service (NMFS) manages the adjacent federal waters of the GOA. Currently, pollock and other groundfish in federal waters of the GOA are assessed through a summer triennial bottom survey conducted by NMFS. ADF&G has based the PWS harvest guideline on summer population assessments. Fish present in the summer in PWS are not assessed by NMFS, and ADF&G has used summer assessment data from SEA to establish guideline harvest levels for PWS pollock. In addition, a cooperative project involving ADF&G, the PWS Science Center and the fishing industry has assessed the pollock spawning population in PWS in the spring. However, the degree of migration and mixing of pollock between PWS and outer GOA waters is unknown. For example, it is not known how these interactions affect the composition of both the commercially fished aggregations and the assessed summer populations.

Successful management of commercial fisheries relies on an understanding of the underlying stock structure. Genetics studies of pollock indicate that heterogeneity exists across large areas, such as between eastern and western Bering Sea. For example, allozyme studies delineated walleye pollock populations from the eastern Bering Sea and Sea of Japan (Iwata 1975a, 1975b). However, early attempts to identify stocks within the southeastern Bering Sea were largely unsuccessful (Grant and Utter 1980). In contrast, a mtDNA study suggested that at least two genetically discrete stocks exist in the eastern Bering Sea, a Donut Hole/Bogoslof Island group and an Adak Island group (Mulligan et al., 1992). That study suggested that the GOA and Donut Hole/Bogoslof Island stocks are more closely related to each other than to the Adak Island

population. This may be due to the movement of adult fish from the GOA to the Bering Sea via Unimak Pass and/or southwestward movement of larval pollock from Shelikof Strait through Unimak Pass. At present, there is insufficient evidence to suggest that gene flow is restricted between the eastern Bering Sea and the western GOA.

The findings of this project will contribute to the conservation of GOA pollock by providing new genetic information for federal and state fisheries managers to incorporate into development of sustainable harvest quotas. Such information will be important to the small fleets that are attempting to restore their livelihood through this displacement fishery.

Currently, ADF&G is coordinating sample collections and genetics stock assessment methods for walleye pollock with the National Marine Fisheries Service (NMFS), Fisheries Oceanography Coordinated Investigations (FOCI) Program. The FOCI Program cooperates with a number of agency and academic scientists in investigations of annual recruitment variations in fish stocks of economic importance, primarily walleye pollock, in the Gulf of Alaska and Bering Sea ecosystems. A key component in much of FOCI's work is identifying pollock larvae as to population of origin. ADF&G is working closely with FOCI for the collection and exchange of tissues from spawning adult pollock from the inner and outer waters of the Gulf of Alaska (GOA) and from the eastern Bering Sea (EBS) for the development of genetics markers. In addition, ADF&G plans to assess the utility of microsatellite primers used by NMFS/FOCI researchers for defining population structure of adult pollock in the GOA. The ADF&G Genetics Laboratory plans to continue to collaborate informally with the NMFS/FOCI scientists with sharing of samples and findings.

2. Rockfish

Little information is available on rockfish abundance and composition in the EVOS-impact area. The Alaska Board of Fisheries effected new area management and district boundaries for rockfish and established rockfish guideline harvest caps and set new state management areas that extend to three miles offshore. Genetic studies that document the population structure where initiated in FY 98 to identify self-recruiting populations and levels of gene flow in rockfish species. Similar genetic studies were useful in documenting gene flow among other species of rockfish (Seeb and Gunderson 1988; Seeb *in press*). Further, in recent years, resource managers have begun to recognize the value of marine refugia for sustaining rockfish populations. Rockfish particularly may benefit from refugia, because they often exhibit localized distributions and reproductive potential is invested in relatively few old, large individuals. In a recent workshop, marine rockfish refugia were identified as one of the few constructive ways to address protection and conservation of essential fish habitat (National Marine Fisheries Service 1998) and maintenance of genetic diversity. Knowledge of the genetic structure of populations will be critical in any efforts to develop marine refugia for rockfish.

This project would continue a genetic study of black rockfish *(S. melanops)*, a species common in both commercial and sport harvests in the oil spill area and a member of the pelagic shelf complex. In addition during FY98 studies of dusky rockfish (*S. ciliatus*) were initiated to address

not only the population structure of this pelagic shelf species throughout the Gulf of Alaska, but also to address the question of the genetic relationship between the light and dark forms (Kramer and O'Connell 1986). In FY99 we propose to enlarge the study to include yelloweye rockfish (*S. ruberrimus*), a member of the demersal shelf complex.

C. Location

Field research will be conducted primarily within the confines of Prince William Sound, EVOS-affected areas of Kodiak Island, Kamishak Bay, Resurrection Bay, the outer Kenai Coast, and adjacent waters of the Gulf of Alaska. Exact sampling locations will depend on the distribution of commercial and assessment survey efforts on spawning pollock and the distribution of commercial and sport fishing efforts of rockfishes. Sampling outside of Prince William Sound will be conducted by ADF&G area staff as appropriate.

Mating studies will be conducted at the ASLC in Seward. Bench fees for this will be determined by negotiations between the Trustee Council and the Seward Association for Advancement of Marine Science. Laboratory sampling and data collection will be conducted at the ADF&G area offices in Cordova and Homer, and the regional office in Kodiak. Laboratory analysis, tissue archiving, and data analysis will be conducted at the ADF&G statewide genetics laboratory in Anchorage and at the ASLC.

Because commercial, subsistence and sport harvests of pollock and rockfish 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 monitoring.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

Components of this proposal were driven by community request. ADF&G is currently grappling with the permitting of funded Trustee Council projects and the evaluation of potential restoration projects and new fisheries in the areas of Kodiak Island, Kenai Peninsula, Alaska Peninsula, and Prince William Sound. Local knowledge from years of fishery management will be used in defining the hypotheses for testing for genetic homogeneity within each species.

Representatives of the fishing industry of PWS and the GOA expressed support for the projects proposed herein, including the North Pacific Processors (Ken Roemhildt, Cordova, Alaska, personal communication); the Alaska Draggers (Jay Stinson, Kodiak, Alaska, personal communication); and Chris Blackburn (Alaska Groundfish Data Bank, Kodiak, Alaska, personal communication). Support includes but is not limited to input on study design, coordination among fishing fleets for acquisition of fishery samples, providing facilities for sample collections, and assisting ADF&G staff with sample collections. The Seward Association for the Advancement of Marine Science (SAAMS) will be consulted to insure projects are consistent with the schedules and processes already in place.

Wherever possible, local-hire will be used to fill positions required for both field sampling and routine laboratory positions. People from the communities in the spill area will have an opportunity to participate in this project as employees of the ADF&G which gives residents priority in hiring for state employment. ADF&G plans to participate in all of the educational and outreach programs scheduled for the Center. In addition, results from this project will be disseminated to the local community through Regional Planning Team meetings.

PROJECT DESIGN

A. Objectives

1. Develop new markers and provide genetic information for federal and state fisheries managers to incorporate into development of sustainable harvest quotas for the displacement fishery on walleye pollock.

2. Utilize new genetic markers to test for gene flow among rockfishes inhabiting the oil spill area.

3. Provide experimental runs of fish for use by visiting scientists for projects such as the *Construction of a Linkage Map for the Pink Salmon Genome* (Project 9X190).

B. Methods

1. Sampling design

Detailed sampling designs for each of the three marine species are summarized in Table 1.

Walleye Pollock

To address stock questions of inner vs. outer GOA walleye pollock, we initiated sample collections and genetics analyses of spawning populations from the inner GOA waters of PWS and from outer GOA waters of Shelikof Strait (N=100 each site). We also included samples from an outside stock for comparison from the Bering Sea (Bogoslof Island N=100). We will use a combination of both mtDNA and nuclear DNA approaches (allozymes and microsatellites) to define the population structure of walleye pollock from the EVOS-affected areas of PWS and the GOA. We will also analyze larvae from known crosses to verify the mode of inheritance and to investigate the presence of null alleles in microsatellites.

Rockfishes

We will develop genetic markers to test for panmixia among rockfish populations inhabiting the greater oil spill area. We will estimate genetic structure and gene flow within the Spill area using analyses of mitochondrial and nuclear DNA. Rockfish of each species samples will be collected

Table 1. Sampling design for genetic analysis of walleye pollock and rockfishes of the genus *Sebastes*. All 1999 samples and 1998 samples followed by (*) are to be collected.

Species	Sampling Locations	Sample Size (N)		
		1997	1998	1999
Walleye Pollock	Prince William Sound (Inner Gulf)	100	100	
	Shelikof Strait (Outer Gulf)	104	100	
	Bogoslof Island (Bering Sea)	120	100	
Black rockfish	Resurrection Bay	82	100*	
	Kodiak Island	100	100*	
	Sand Point, Alaska Peninsula		100*	100
	Prince William Sound		100*	100
	SE Alaska		100*	100
Dusky rockfish (light)	NE Gulf		100*	100
	Prince William Sound		100*	100
	Kodiak	50	100*	
Dusky rockfish (dark)	NE Gulf		100*	100
	Prince William Sound		100*	100*
	Kodiak	50	100*	
Yelloweye rockfish	Central Gulf		100	100
	Prince William Sound/Resurrection Bay		100*	100
	SE Alaska		100*	100

from up to five sites from within the EVOS-affected area. Samples will be collected in each of two years to better characterize genetic structure. A target sample size of 100 individuals will be set for each site for each year. Sites will be chosen to maximize the geographic representation within the affected areas. Sampling will be coordinated with Project 99354—*Development of habitat-based population assessment for near shore rockfish along the northern Gulf of Alaska*, which will greatly increase the potential for adequate sample sizes and coverage.

All specimens will be analyzed for mitochondrial DNA and microsatellites. Fin clips from individual fish will be placed in ethanol. Muscle, liver, eye, and heart tissues for allozymes analyses will be collected when convenient for shipment to Washington Department of Fish and Wildlife (WDF&W). WDF&W has been conducting an allozyme survey of black rockfish and has requested specimens from Alaskan waters. Liver tissue for allozyme analysis of *ADH* will also be collected from dusky rockfish as it is informative in differentiating among the light and dark phases (ADF&G, unpublished data).

2. Laboratory Analysis

DNA will be extracted using either phenol-chloroform extractions (Sambrook et al. 1989) or a rapid precipitation method (Gentra Systems, Inc. P.O. Box 13159, Research Triangle, N.C. 27709-13159). This process includes: (1) a cell lysis solution to break down cell and nuclear membranes; (2) a Proteinase K digest to denature proteins; (3) an RNase treatment to digest RNA; (4) protein precipitation to remove Proteinase K, RNase, and denatured proteins; (5) isopropanol to precipitate DNA; (6) 70% ethanol to wash DNA; and finally (7) a hydration solution to rehydrate DNA. DNA will be extracted from liver, muscle, and fin clips depending on the available tissue and species. The DNA stocks will be diluted to a final concentration of approximately 100ng/µl for use in the polymerase chain reaction (PCR). After extraction, the DNA will be amplified using species-specific microsatellite and mtDNA primers.

Microsatellite Analysis

Analysis of walleye pollock microsatellites will be investigated using three approaches as pollock-specific primers are not yet available. Screening utilizing existing Atlantic cod primers (*Gmo1, Gmo2, Gmo9, Gmo10, Gmo123, Gmo132, Gmo145*; Brooker et al. 1994) was begun during FY98. Other primers are currently under development in the laboratory of Dr. Paul Bentzen at the University of Washington. These primers will be incorporated into the study as they become available. If available in time for this project, the small number of pollock-specific primers developed by the Stanford University under contract to National Marine Fisheries Service (NMFS) will also be surveyed (Dennis Powers, Hopkins Marine Laboratory, Stanford University, Pacific Grove, CA; personal communication).

Microsatellite primers from *Sebastes* rockfish species have been recently developed in the laboratory of Dr. Paul Bentzen at the University of Washington by Dr. Peter Wimberger of the University of Puget Sound. Primers were developed from *Sebastes maliger*. We are currently screening five of their primers on black and dusky rockfishes (*Sma 2, Sma12, Sma26, Sma29,* and

Sma35). Additional primers will likely become available during FY99.

All microsatellite analyses will be conducted at the ADF&G Genetics Laboratory on either an ABI 377 or ABI 373A automated sequencer. We chose to pursue an automated approach to the analysis of microsatellites as it allows for highly efficient detection of multiple loci in a single lane utilizing a fluorescent four-color dye system (Ziegle et al. 1992; Olsen et al. 1996). One color is devoted to an internal lane standard leaving three colors available for labeling primers. Band sizes are called automatically from the known standards using the GeneScan Software (ABI Applied Biosystems 1996), and genotypes are assigned using the Genotyper Software (ABI Applied Biosystems 1994). Our laboratory has resolved up to ten loci in a single lane separating loci by size and color.

Mitochondrial DNA

Previous studies of mtDNA from walleye pollock have surveyed the entire mitochondrial genome for RFLP variation (Mulligan et al. 1992) and sequenced the control region (Shields and Gust 1995). Rather than follow either of those laborious approaches, we are currently using PCR to amplify specific sections of the molecule similar. During FY98 we have identified useful variation in the ND5/6, cytochrome *b*, and cytochrome oxidase regions using primers developed by Park et al. (1993), Cronin et al. (1993), and Palumbi (1996).

Our approach to the study of mtDNA in rockfish is similar to that of walleye pollock. We have already successfully amplified ND5/6, ND3/4, Cytochrome *b*, ND2, 16S rDNA, cytochrome oxidase I, and D-Loop from other *Sebastes* species and are now screening those regions for useful variation in each species..

Amplified DNA will be cut with restriction enzymes and electrophoresed on agarose gels. Fragments will be visualized under UV light, and a photographic record will be made of each gel. Since genes which are encoded by the mitochondrial genome are inherited as a single unit (i.e., analogous to linked loci), the restriction sites detected for each enzyme, for all regions examined, will be pooled as composite haplotypes. The frequencies and distributions of these composite haplotypes will then be used to examine the structure of the populations under study.

Allozymes

Allozyme electrophoresis will be conducted on pollock samples following the techniques of (Iwata 1975a, 1975b; Grant and Utter 1980). Allozyme techniques will follow those of Harris and Hopkinson (1976), May et al. (1979), and Aebersold et al. (1987); nomenclature will follow the American Fisheries Society standard (Shaklee et al. 1990). Gels will be scored using on-line scoring programs developed by ADF&G.

3. Statistical Analyses

Nuclear markers (allozymes and microsatellites)

S-plus analytical software (Mathsoft, Inc., Seattle WA), *Arlequin* ver 1.1 (Schneider, et al. 1997), and *GENEPOP* Version 3.1 (Raymond and Rousset 1995) will be used to calculate allele frequency estimates, to test for conformation of genotype frequencies to Hardy-Weinberg expected frequencies using log-likelihood ratios, calculate genetic distances and heterogeneity among collections, and to estimate gene flow among collections. Sequential Bonferroni corrections (Rice 1989) will be used to adjust significance levels as required. Neighbor-joining (Saitou and Nei 1987), UPGMA, and maximum likelihood trees will be constructed using *NTSYS* (Rohlf 1993) and *PHYLIP* (Felsenstein 1993).

Mitochondrial DNA

Nucleotide (π) and haplotype (h) diversity measures (Nei 1987) will be calculated for all collections using the restriction enzyme analysis package (*REAP*; McElroy et al. 1992). These measures estimate the number of nucleotide substitutions per site between DNA sequences (i.e., sequence divergence) and the amount of DNA polymorphism within collections, respectively. To test for heterogeneity among populations, Monte Carlo simulations with 10,000 replicates will be performed (Roff and Bentzen 1989) using the *REAP* analysis program (McElroy et al. 1992). An analysis of the distribution of molecular variance will be made using *Areliquin* and *AMOVA* (Excoffier et al. 1992).

4. Experimental matings and fish runs

Implementing experimental runs of fish is following the guidelines of ADF&G. Runs of anadromous fish will be small, for experimental purposes only. Permits will address: 1) species to be included, 2) source and timing of broodstocks, 3) schedule for developing the runs, and 4) stock transfer and fish rearing and release.

Initial efforts will focus on development of a run of pink salmon to support ASLC research proposed by University of Montana. Broodstock will be collected from a local Resurrection Bay source in August of 1998. A small release of coho salmon to support general university research will occur in June 1998. Other experimental matings will be conducted to test the Mendelian inheritance of Pacific herring microsatellite markers developed as a component of project 97165 and Atlantic cod microsatellite markers for use in pollock studies (see above). Inheritance of rockfish markers will be determined by testing for mendelian segregation of maternal phenotypes from larvae shed from gravid females held in captivity.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

Seward Association for Advancement of Marine Science, UAF Institute of Marine Science (IMS), University of Montana

NORMAL AGENCY MANAGEMENT

This project is not required of ADF&G by statute or regulation.

ADF&G spends approximately $500.0K from State of Alaska general funds annually on genetics studies. Salaries and benefits investigators D. Moore, J. Seeb and L. Seeb are fully covered by these general funds. These funds also support the basic operation of and enhancements to the Anchorage genetics laboratory for ADF&G management projects as well as EVOS projects. These general funds from the legislature are ear-marked for specific projects; although they may be used for leadership of EVOS studies, no general funds are available to institute new research such as this. The *Exxon Valdez* Trustee Council has shouldered the burden of research into the ecology and genetics of species within the spill zone. The studies outlined herein would not have been conducted by the State in the absence of the oil spill.

Commercial Fisheries Management and Development Division scientists perform management-oriented studies to identify conservation units of commercially important resources at the direction of the Director. Funds are limited and generally restricted to major contentious issues facing the Alaska Board of Fisheries. The need for characterization of the genetic structure of the species in this proposal has increased as a direct result of the EVOS either because the species were injured and have not recovered or because their recovery is unknown (*Exxon Valdez* Oil Spill Trustee Council 1996). Understanding of stock structure of these species is critical to fisheries management because it provides managers with the appropriate scale by which to base management decisions aimed at restoring the species to pre-spill abundance.

Once the data have been collected on the genetic structure of the proposed species, they will be useful to the Department for future management and the database will be maintained and updated by the Department after the project funding ends.

The Trustee Council has funded genetic study of injured resources at levels approaching $1,000.0K during many years post-spill. These major projects resulted in an improved knowledge of fisheries resources and provided permanent improvements to resource management.

This project is designed to be a restructuring of these major, short-lived projects into a longer-term project with several minor elements addressing population genetics issues in the spill area. Elements may be modified in future years to address population issues identified through collaborative research at the Alaska SeaLife Center. Additionally, this project offers a core genetics presence to other principal investigators at the SeaLife Center and provides experimental fish runs for long-term research.

SCHEDULE

A. Measurable Project Tasks for FY98-99

February -May 1998:	Collect pollock tissue samples (NMFS assessment survey crews, area ADF&G staff, commercial fishing vessels)
May - August 1998, 1999:	Collect rockfish tissue samples (area ADF&G staff)
April 1998:	Recruit and hire ASLC staff (process underway at this time)
Oct. 1997-Sept. 1999:	Begin protocol development, lab analysis of pollock and rockfish samples
April 1998:	Plan 1998 rockfish collections
March - April 1998:	Prepare 99252 proposal
May - August 1998,1999:	Rockfish tissue collections
Aug. – Sept. 1998, 1999:	Pink salmon spawning
July-September 1999:	Analyze laboratory data
January - March 1999:	Pollock tissue collections and matings
April 1999:	Annual report

B. Project Milestones and Endpoints

February, 1998	Experimental pollock matings (3 successfully conducted to date)
April 15, 1998:	Proposal for Project 99252
May, 1998	Obtain gravid rockfish for inheritance study at ASLC
Sept. 30, 1998:	First pink salmon egg take for ASLC salmon run
April 15, 1999:	Reporting 98252, proposal for Project 00252 First Recommendations pollock and rockfish management
Sept. 30, 1999:	Egg take for odd-year pink salmon run
April 15, 2000:	Reporting 99252, proposal for Project 01252
Sept. 30, 2000:	First adult returns from pink salmon run
April 15, 2001:	Reporting 00252, proposal for Project 02252
Sept. 30, 2001:	Odd-year return pink salmon

C. Completion Date

September 30, 2002

PUBLICATIONS AND REPORTS

Annual Reports, annual reporting of significant findings in the peer-reviewed literature

PROFESSIONAL CONFERENCES

Results from one or more elements will be presented at the annual meeting of the American Fisheries Society.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

Efforts will be coordinated through regional and area staff of ADF&G as appropriate to design genetics studies that guide the Trustee Council restoration projects, especially those that involve stocking or transport of fish. Special effort will be expended to coordinate with and offer use of the core facility to IMS faculty and NOAA and NBS staff that conduct research at the Alaska SeaLife Center in Seward. Tissue archival and biometric analyses will be coordinated among all Trustee Council projects related to genetics including 98196 and 98165.

Data collection techniques will be coordinated through the inter-agency consortium of laboratories that cooperate on similar projects of conservation genetics of marine fishes in the North Pacific Ocean.

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1988-1990 Assistant Professor, Southern Illinois University
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1978-1980 Fish Biologist, Washington Department of Fisheries

SELECTED PUBLICATIONS:

Seeb, J.E., L.W. Seeb, and F.M. Utter. 1986. Use of genetic marks to assess stock dynamics and management programs for chum salmon. Trans. Amer. Fish. Soc. 115:448-454.

Seeb, J.E., and L.W. Seeb. 1986. Gene mapping of isozyme loci in chum salmon (*Oncorhynchus keta*). J. Hered. 77:399-402.

Seeb, J.E., L.W. Seeb, D.W. Oates, and F.M. Utter. 1987. Genetic variation and postglacialdispersal of populations of northern pike (*Esox lucius*) in North America. Can. J. Fish. Aquat. Sci. 44:556-561.

Utter, F.M., and J.E. Seeb. 1990. Genetic marking of fishes: overview focusing on protein variation. Am. Fish. Soc. Sym. 7:426-438.

Seeb, J.E., G.H. Kruse, L.W. Seeb, and R.J. Weck. 1990. Genetic structure of red king crab populations in Alaska facilitates enforcement of fishing regulations. Proceedings of the International Symposium on King and Tanner Crabs. Alaska Sea Grant, Fairbanks, AK. pp 491-502.

Seeb, J.E., and G.D. Miller. 1990. The integration of allozyme analyses and genomic manipulations for fish culture and management. *In*: D.H. Whitmore, Editor. Electrophoretic and Isoelectric Focusing Techniques in Fisheries Management. CRC Press, Boca Raton, pp

266-279.

Gharrett, A. J. B. Riddell, J. Seeb, and J. Helle. 1993. Status of the Genetic Resources of Pacific Rim Salmon. In: J. Cloud, Editor. Genetic Conservation of Salmonid Fishes. Plenum Press, New York. pp. 286-292.

Utter, F. M., J. E. Seeb, and L. W. Seeb. 1993. Complementary uses of ecological and biochemical genetic data in identifying and conserving salmon populations. Fisheries Research. Fish. Res. 18:59-76.

Miller, G. D., J. E. Seeb, B. G. Bue and S. Sharr. 1994. Saltwater exposure at fertilization induces ploidy alterations, including mosaicism, in salmonids. Can. J. Fish. Aquat. Sci. 51(Suppl.1):42-49.

Crane, P. A., L. W. Seeb, and J. E. Seeb. 1994. Genetic relationships among *Salvelinus* species inferred from allozyme data. Can. J. Fish. Aquat. Sci. 51(Suppl. 1):182-197.

Seeb, L. W. C. Habicht W. D. Templin, K. E. Tarbox R. Z. Davis, L. K. Brannian, J. E. Seeb. 1998. Genetic diversity of sockeye salmon (*Oncorhynchus nerka*) of Cook Inlet, Alaska, and its application to restoration of populations affected by the *Exxon Valdez* oil spill. Canadian Journal of Fisheries and Aquatic Sciences. *Accepted and in press.*

Seeb, J. E. C. Habicht, J. B. Olsen, and L. W. Seeb. 1998. An overview of gene detection methods used to study population variation in salmonids. Assessment and Status of Pacific Rim Salmonid Stocks. North Pacific Anadromous Fish Commission, Vancouver B.C. *Accepted and in press.*

Habicht, C., S. Sharr, and J. E. Seeb. 1998. Coded wire tag placement affects homing ability of pink salmon. Transactions of the American Fisheries Society. *Accepted and in press.*

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1991-	Statewide and Principal Geneticist, ADF&G, Anchorage
1991-	Affiliate Associate Professor, University of Alaska Fairbanks
1988-1990	Assistant Professor, Southern Illinois University
1984-1988	Research Assist. Prof., University of Idaho
1978-1981	Fish Geneticist, Pacific Fish. Research, Olympia WA
1977-1979	Geneticist, National Marine Fisheries Service, Seattle

SELECTED PUBLICATIONS:

Wishard, L. N., J. E. Seeb, F. M. Utter, and D. Stefan. 1984. A genetic investigation of suspected redband trout populations. Copeia 1984(1):120-132.

Seeb, J. E., L. W. Seeb, and F. M. Utter, 1986. Use of genetic marks to assess stock dynamics and management programs for chum salmon. Trans. Amer. Fish. Soc. 115:448-454

Seeb, L. W. and D. R. Gunderson. 1988. Genetic variation and population structure of Pacific ocean perch (Sebastes alutus). Can. J. Fish. Aquat. Sci. 45:78-88.

Seeb, L. W., J. E. Seeb, R. L. Allen and W. K. Hershberger. 1990. Evaluation of adult returns of genetically marked chum salmon, with suggested future applications. American Fisheries Society Symposium 7:418-425

Seeb, L. W., J. E. Seeb and A. J. Gharrett. 1990. Genetic marking of fish populations. pp 223-239 *in* D. H. Whitmore, ed. Electrophoretic and isoelectric focusing techniques in fisheries management. CRC Press, Boca Raton, FL.

Seeb, L. W., J. E. Seeb and J. J. Polovina. 1990. Genetic variation in highly exploited spiny lobster *Panulirus marginatus* populations from the Hawaiian Archipelago. Fishery Bulletin 88:713-718.

Seeb, L. W. and A. W. Kendall. 1991. Allozyme polymorphisms permit the identification of

larval and juvenile rockfishes of the genus *Sebastes*. Environmental Biology of Fishes 30:191-201.

Utter, F. M., J. E. Seeb, and L. W. Seeb. 1993. Complementary uses of ecological and biochemical genetic data in identifying and conserving salmon populations. Fisheries Research. Fish. Res. 18:59-76.

Crane, P. A., L. W. Seeb, and J. E. Seeb. 1994. Genetic relationships among *Salvelinus* species inferred from allozyme data. Can. J. Fish. Aquat. Sci. 51(Suppl. 1):182-197.

Seeb, J. E., C. Habicht, J. B. Olsen, P. Bentzen, J. B. Shaklee, and L. W. Seeb. 1998. Allozyme mtDNA and microsatellite variants describe structure of populations of pink and sockeye salmon in Alaska. North Pacific Anadromous Fish Commission Bull. No. 1:300-318.

Scribner, K. T., P. A. Crane, W. J. Spearman, and L. W. Seeb. *In press*. DNA and allozyme markers provide concordant estimates of population differentiation: analyses of U. S. and Canadian populations of Yukon River fall-run chum salmon. Canadian Journal of Fisheries and Aquatic Sciences.

Olsen, J. B., L. W. Seeb, P. Bentzen, and J. E. Seeb. *In press*. Genetic interpretation of broad-scale microsatellite polymorphism in odd-year pink salmon. Transactions of the American Fisheries Society.

Seeb, L. W. and P. A. Crane. Allozymes and mtDNA discriminate Asian and North American populations of chum salmon in mixed-stock fisheries in the northern Pacific Ocean. Accepted pending revision. Transactions American Fisheries Society

Seeb, L. W. and P. A. Crane. High genetic heterogeneity in chum salmon in Western Alaska, the contact zone between Asia and North America. Accepted pending revision. Transactions American Fisheries Society

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EDUCATION: B.S., Fish & Wildlife Management, 1975, University of Idaho

PROFESSIONAL EXPERIENCE:

1998-	Fisheries Biologist, ADF&G, CFMD Division
1994-1997	Assistant Fisheries Program Manager, ADF&G, Habitat and Restoration Division
1980- 1993	Hatchery Manager, ADF&G, F.R.E.D. Division, Big Lake Hatchery
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LITERATURE CITED

ABI (Applied Biosystems Inc.). 1996. GeneScan v 2.1.

ABI (Applied Biosystems Inc.). 1994. Genotyper 1.1 DNA fragment analysis software. Users manual Rev. A.

Aebersold, P. B., G. A. Winans, D. J. Teel, G. B. Milner, and F. M. Utter. 1987. Manual for starch gel electrophoresis: A method for the detection of genetic variation. NOAA Technical Report NMFS 61, U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 19 p.

Brooker, A. L., D. Cook, P. Bentzen, J. M. Wright, and R. W. Doyle. 1994. Organization of microsatellites differs between mammals and cold-water teleost fishes. Canadian Journal of Fisheries and Aquatic Sciences 51:1959-1966.

Cronin, M. A., W. J. Spearman, R. L. Wilmot, J. C. Patton, and J. W. Bickham. 1993. Mitochondrial DNA variation in chinook (*Oncorhynchus tshawytscha*) and chum salmon (O. *keta*) detected by restriction enzyme analysis of polymerase chain reaction (PCR) products. Canadian Journal of Fisheries and Aquatic Sciences 50:708-715.

Excoffier, L., P. E. Smouse, and J. M. Quattro. 1992. Analysis of molecular variance inferred from metric distances among DNA haplotypes - application to human mitochondrial DNA restriction data. Genetics 131:479-491.

Felsenstein, J. 1993. PHYLIP (Phylogeny Inference Package) Version 3.5c. Department of Genetics, University of Washington, Seattle. Distributed by the author.

Grant, W. S. and F. M. Utter. 1980. Biochemical genetic variation in walleye pollock, *Theragra chalcogramma*: population structure in the southeastern Bering Sea and the Gulf of Alaska. Can. J. Fish. Aquat. Sci. 37:1093-1100.

Harris, H. and D. A. Hopkinson. 1976. Handbook of enzyme electrophoresis in human genetics. American Elsevier, New York.

Iwata, M. 1975a. Genetics identification of walleye pollock (*Theragra chalcogramma*) based on tetrazolium oxidase polymorphism. Comp. Biochem. Physiol. 50B:197-201.

Iwata, M. 1975b. Population identification of walleye pollock (*Theragra chalcogramma)* (Pallas) in the vicinity of Japan. Mem. Fac. Fish. Hokkaido Univ. 22:193-258.

Kocher, T. D., W. K. Thomas, A. Meyer, S. V. Edwards, S. Paabo, F. X. Villablanca, and A. C.

Wilson. 1989. Dynamics of mitochondrial DNA evolution in animals: Amplification and sequencing with conserved primers. Proc. Natl. Acad. Sci. USA 86:6196-6200.

Kramer, D. E and O'Connell, V. M. 1986. Guide to Northeast Pacific rockfishes, Marine Advisory Bulletin #25. University of Alaska, Fairbanks, AK.

May, B., J. E. Wright, and M. Stoneking. 1979. Joint segregation of biochemical loci in Salmonidae: Results from experiments with *Salvelinus* and review of the literature on other species. J. Fish. Res. Board Can. 36:1114-1128.

McElroy, D., P. Moran, E. Bermingham, and I. Kornfield. 1992. REAP - An integrated environment for the manipulation and phylogenetic analysis of restriction data. J. Hered. 83:157-158.

Mulligan, T. J., R. W. Chapman, and B. L. Brown. 1992. Mitochondrial DNA analysis of walleye pollock, *Theragra chalcogramma*, from the eastern Bering Sea and Shelikof Strait, Gulf of Alaska. Can. J. Fish. Aquat. Sci. 49:319-326.

National Marine Fisheries Service. 1998. Proceedings of a workshop on marine harvest refugia for west coast rockfish. September 17-18, 1997, Pacific Fisheries Environmental Laboratory, Pacific Grove, California.

Nei, M. 1987. Genetic distance and molecular phylogeny. Pp. 193-223 *in* Ryman, N. and F. Utter, eds. Population genetics and fishery management. Washington Sea Grant, Univ. Wash. Press, Seattle.

Olsen, J. B., J. K. Wenburg, and P. Bentzen. 1996. Semi-automated multilocus genotyping of Pacific salmon *(Oncorhynchus* sp.) using microsatellites. Molecular Marine Biology and Biotechnology 5:259-272.

Palumbi, S. R. 1996. Nucleic acids II: the polymerase chain reaction. Pp. 205-247 *in* Hillis, D. M, C. Moritz, and B. K. Mable, eds. Molecular systematics, Second edition. Sinauer Associates, Sunderland, MA.

Park, L. K., M. A. Brainard, D. A. Dightman, and G. A. Winans. 1993. Low levels of intraspecific variation in the mitochondrial DNA of chum salmon (*Oncorhynchus keta*). Mol. Mar. Biol. Biotech. 2:362-370.

Raymond, M. and F. Rousset. 1995. GENEPOP (Version 1.2): Population genetics software for exact tests and ecumenicism. Journal of Heredity 86:248-249.

Rice, W. R. 1989. Analyzing tables of statistical tests. Evolution 43:223-225.

Roff, D. A. and P. Bentzen. 1989. The statistical analysis of mitochondrial DNA polymorphisms: $X2$ and the problem of small samples. Mol. Biol. Evol. 6:539-545.

Rohlf, F. J. 1993. NTSYS-pc, Numerical taxonomy and multivariate analysis system, V 1.8. Exeter Software, Setauket, NY.

Saitou, N. and M. Nei. 1987. The neighbor-joining method: A new method for reconstructing phylogenetic trees. Mol. Biol. Evol. 4:406-425.

Sambrook, E., Fritsch, F., and Maniatis, T. 1989. Molecular Cloning. Cold Spring Harbor Press, Cold Spring Harbor, NY.

Schneider, S., J.-M. Kueffer, D. Roessli, and L. Excoffier. Arlequin ver. 1.1.: A software for population genetic data analysis. Genetics and Biometry Laboratory, University of Geneva, Switzerland.

Seeb, L. W. *In press*. Gene flow and introgression within and among three species of rockfishes, *Sebastes auriculatus, S. caurinus*, and *S. maliger*. Journal of Heredity.

Seeb, L. W. and D. R. Gunderson. 1988. Genetic variation and population structure of Pacific ocean perch (*Sebastes alutus*). Can. J. Fish. Aquat. Sci. 45:78-88.

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

Shields, G. F. and J. R. Gust. 1995. Lack of geographical structure in mitochondrial DNA sequences of Bering Sea walleye pollock, *Theragra chalcogramma*. Mol. Mar. Biol. Biotech. 4:69-82.

Ziegle, J. S., Y. Su, K. P. Corcoran, Nie. L., P. E. Mayrand, L. B. Hoff, L. J. McBride, M. N. Kronick, and S. R. Diehl. 1992. Application of automated DNA sizing technology for genotyping microsatellite loci. Genomics 14:1026-1031.

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$104.3	$154.5
Travel	$10.3	$11.1
Contractual	$38.8	$41.7
Commodities	$30.3	$30.3
Equipment	$7.0	$0.0
Subtotal	$190.7	$237.6
General Administration	$18.4	$26.1
Project Total	$209.1	$263.7
Full-time Equivalents (FTE)		2.9
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FY 2000	Estimated FY 2001	Estimated FY 2002
$272.0	$281.0	$290.0

Dollar amounts are shown in thousands of dollars.

Comments:

The FY99 project cost and the out year costs do not include SeaLife Center bench fees.

FY 99

Prepared:

Project Number: 99252
Project Title: Investigations of Genetically Important Conservation Units of Species Inhabiting the EVOS Area
Agency: AK Dept. of Fish & Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 1999
Kerkvliet	FBI(PCN 7043)	14D	3.0	4150		12.5
Debevec	FWTIII	11C	8.0	3391		27.1
Vacant	FBIII	18A	12.0	4866		58.4
Vacant	FBII	16D	12.0	4710		56.5
	Subtotal		35.0	17117	0.0	
					Personnel Total	$154.5

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 1999
Anch to Cordova, full fare	166	4	4	150	1.3
Anch to Kodiak, full fare	236	4	4	150	1.5
Anch. to Homer	148	2	2	150	0.6
Anchorage to Seward , per diem			30	150	4.5
Anchorage to Lower 48, Professional Meeting	650	1	4	150	1.3
Personal Vehicle mileage to Seward	80	24			1.9
				Travel Total	$11.1

FY 99

Prepared:

Project Number: 99252
Project Title: Investigations of Genetically Important Conservation Units of Species Inhabiting the EVOS Area
Agency: AK Dept. of Fish & Game

FORM 3B
Personnel
& Travel
DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:	Proposed
Description	FY 1999
Freight	2.0
Photography	0.5
Office Expenses	0.5
Telephone/fax- long distance	1.0
Sequencer warranty	6.0
Air charter (6 hours x $275 per hour)	1.7
Contract with ASLC for technician	30.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$41.7

Commodities Costs:	Proposed
Description	FY 1999
DNA chemicals - (pollock)	12.0
DNA chemicals (black rockfish)	10.0
Allozyme chemicals	3.0
Plastics (cryovials, disposable pipettes, etc.)	1.2
Misc. supplies	0.5
Sampling supplies; containers, liquid nit., etc.	3.0
Boat gas	0.2
Boots, life jackets	0.4
Commodities Total	$30.3

FY 99

Prepared:

Project Number:99252
Project Title: Investigations of Genetically Important Conservation Units of Species Inhabiting the EVOS Area
Agency: AK Dept. of Fish & Game

FORM 3B
Contractual & Commodities
DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY 99

Project Number: 99252
Project Title: Investigations of Genetically Important Conservation Units of Species Inhabiting the EVOS Area
Agency: AK Dept. of Fish & Game

FORM 3B
Equipment
DETAIL

Prepared:

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$104.3	$154.5
Travel	$10.3	$11.1
Contractual	$38.8	$41.7
Commodities	$30.3	$30.3
Equipment	$7.0	$0.0
Subtotal	$190.7	$237.6
General Administration	$18.4	$26.1
Project Total	$209.1	$263.7
Full-time Equivalents (FTE)		2.9
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FY 2000	Estimated FY 2001	Estimated FY 2002
$272.0	$281.0	$290.0

Dollar amounts are shown in thousands of dollars.

Comments:

The FY99 project cost and the out year costs do not include SeaLife Center bench fees.

FY 99

Prepared:

Project Number: 99252
Project Title: Investigations of Genetically Important Conservation Units of Species Inhabiting the EVOS Area
Agency: AK Dept. of Fish & Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

99256B

Sockeye Salmon Stocking at Solf Lake

Project number:	99256b
Restoration Category:	General Restoration
Proposer:	USFS
Lead Trustee Agency:	USFS
Cooperating Agencies:	ADF&G
Alaska Sea Life Center:	No
Duration:	4th year, 7-year project
Cost FY 1999:	$68.2
Cost FY 2000:	$105
Cost FY 2001:	$72.5
Cost FY 2002:	$53.1
Geographic Area:	Prince William Sound
Injured Resource:	Subsistence/Sockeye Salmon

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EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

ABSTRACT

This continuing *Exxon Valdez* Oil Spill (EVOS) project project was designed to benefit subsistence users of Prince William Sound focusing on residents of Chenega Bay. Solf Lake has been recognized for many years as an excellent opportunity to re-establish a self-sustaining sockeye salmon run lost as a result of an earthquake in the 1930's. Initial investigations, beginning in FY96, indicate the lake is still capable of supporting a harvestable population of salmon provided access to migratory fish was improved. Work proposed for this year includes: finalizing the design on the migration channel, collecting eggs, rearing and releasing sockeye fry, and monitoring fish out-migration and the limnological characteristics of the lake.

INTRODUCTION

The purpose of this project is to establish a sustainable sockeye fishery available to subsistence users in Prince William Sound. This proposal is a continuation of the Sockeye Salmon Stocking project 98256B at Solf Lake. The project was initially funded by the Trustees in 1996 (96256B) as a feasibility study. Additional work was conducted in 1997 (97256B) with installation of a lake outlet flow control structure and design engineering of one of the key weirs. The productivity of Solf Lake has been evaluated by the Alaska Department of Fish and Game (ADF&G) and the lake was determined to be able to support a sustainable run of 10,000 sockeye salmon. In 1998, (98256B) the weir structures will be constructed and the in-stream passage structures will be designed. The Forest Service has coordinated with the ADF&G, the Prince William Aquaculture Corporation (PWSAC), and the Regional Planning Team (RPT) to rear and release 100,000 sockeye fry into the lake beginning in 1998. The fry are being reared at the Main Bay Hatchery.

The purpose of this proposal is to secure the funding necessary to continue the multi-year project. The work proposed in 1999 includes: 1) a detailed engineering design for the final phase of outlet channel structure work (the 1998 construction will alter the flows into the primary outlet channel, and hence, final design changes must be completed to account for the different conditions which are unknown at this time), 2) collect eggs, rear and release sockeye fry, and 3) monitor out-migration and the limnological characteristics of the lake.

NEED FOR THE PROJECT

A. Statement of Problem

Subsistence is identified as a lost or reduced service by the Oil spill Trustee Council. This project was designed to mitigate these losses by re-establishing a historic run of sockeye salmon in Solf Lake to provide these opportunities for users of PWS. Historically, Solf Lake supported a run of sockeye salmon. However, an earthquake in the 1930's created a barrier to fish passage causing the population to go extinct. Work completed thus far indicates the lake is capable of producing a self sustaining and harvestable run of sockeye and represents an excellent opportunity to provide a subsistence opportunity in PWS.

B. Rationale/Link to Restoration

The *Exxon Valdez* Restoration Office's Invitation to submit proposals for FY99 stated that subsistence users have reported that they are traveling greater distances and must invest more time in subsistence harvesting than they did prior to the spill. Unlike many other oil spill communities, Chenega Bay still shows reduced subsistence harvest levels and a greater reliance on subsistence harvest of salmon (Seitz and Fall, 1995; Seitz and Miraglia, 1995). Solf Lake is located approximately 40 miles from Chenega Bay and provides an opportunity to establish a

replacement fishery that is accessible to subsistence users. Establishing this fishery would directly benefit subsistence users in Western Prince William Sound.

C. Location

Solf Lake is located off of Herring Bay on Knight Island. The lake is approximately 40 miles by boat from Chenega Bay and 46 miles from Whittier. The lake is unnamed on USGS maps; however, Nickerson (1978), PWSRPT (1983 and 1986) and Barto and Nelson (1982) all refer to the lake as Solf Lake (ADF&G Stream 690). The lake is described in the Anadromous Waters Catalog as number 226-10-16900-0010 (ADF&G, 1992).

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

This project is designed specifically to benefit subsistence users of PWS; therefore, community involvement is an important component for the success of the project. Contacts with the Chenega Bay community liaison will be maintained throughout all phases of this project. Opportunities will be identified to include residents of Chenega Bay in habitat improvement work or in the post-stocking monitoring program.

PROJECT DESIGN

A. Objectives

Feasibility/Planning Phase

1. Determine if a self-sustaining population of sockeye salmon could be established in Solf Lake (completed).
2. Determine appropriate salmon stocking levels (completed).
3. Determine an appropriate brood stock and the necessary logistics to begin a stocking program (completed and ongoing).
4. Evaluate and determine fish passage needs to ensure adequate conditions for adult migration (to be completed in FY99).

Implementation Phase

1. Design and construct necessary improvements to the outlet channel and dam to ensure adequate passage for adult salmon migration (initiated in FY97 and ongoing through FY00).
2. Stock Solf Lake with sockeye salmon to produce a self-sustaining population that can provide an adequate subsistence harvest (stocking begins in 1998 and ends in 2002).

3. Monitor zooplankton and smolt out-migration to ensure appropriate stocking levels (monitoring begins in 1998 and continues through 2003).

B. Methods

Methods have been previously described within the 1996, 1997, and 1998 proposals. Most of the feasibility/planning objectives have been met. The methods remain similar to those of the prior years. Adjustments have been made to focus on the 1999 proposal.

Stocking Program (1998 to 2002): Appropriate stocking levels and strategies have been determined in coordination with ADF&G and PWSAC using all available data. Fry are currently being short-term reared at the Main Bay Hatchery and will be transported to the lake in 1998 for release. The Eyak and Coghill stocks are identified in the PWS/CR Phase 3 Comprehensive Salmon Plan (PWS/CR RPT, 1994) as potential stocks for Solf Lake. At least four years of fry transplants would be required to establish a sockeye salmon run.

On the recommendation of the RPT, Eyak fish were initially selected as the brood stock for the Solf Lake project. At that time, there was concern that the incubation temperatures were too high in Solf Lake early run Eyak fish. However, an early run stock was chosen to minimize management conflicts. Since that time, PWSAC has updated their Area Management Plan which includes discontinuing the rearing of all sockeye stocks except Coghill fish at the Main Bay facility. On February 18, 1998 a letter was sent to the RPT indicating that the Forest Service had no objection to switching the stock to Coghill fish, since these fish are also identified in the PWS/CR Phase 3 Comprehensive Salmon Plan as a suitable stock for Solf Lake. The mid-run timing of the Coghill fish may additionally provide a more favorable incubation period than the Eyak stock, increasing probabilities of success.

Channel Modifications : It was determined in 1996 that channel modifications were necessary to establish a sustainable run of sockeye salmon. Forest Service engineers and biologists evaluated the two outlet channels in 1997. The initial flow control structure was installed in 1997 and a detailed design of the diversion weir was completed. The diversion weir is scheduled to be installed in 1998. Once installed, the lake's outflow can be effectively channeled into the stream targeted for fish passage. When this flow is established and the stream hydraulics evaluated, the Forest Service intends to survey and design the final set of weirs/fish pass to complete the channel modifications. Survey and design would occur under this 1999 proposal. The weir/fish pass would be constructed in 2000.

Monitoring: Beyond the 1996 feasibility data, limnological data will be collected annually beginning in 1998 to evaluate the affect of the stocking program on the lake's plankton population. This monitoring will include a summer and fall sampling period for water chemistry analysis and monthly zooplankton sampling from May through September. These procedures are described in detail in Koenings et. al. (1987). . This monitoring would continue through the stocking period (1998 to 2002) unless it was determined unnecessary.

The success of the stocking program would also be monitored through the smolt out migration and adult escapement. Smolt will be collected by fyke net or weir to estimate the total out migration. Fish will be sampled to determine age, length and weight characteristics which can be used to evaluate the health of the population. Coded wire tags or thermal marking would be used to monitor the adult population. Returning adults will be enumerated at a weir on the outlet stream and if possible with aerial surveys. Scales will also be collected and the age structure of the returning fish will be analyzed. The first adults are anticipated to return in 2002.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

The ADF&G will be responsible for limnological data collection and analysis. The USFS will conduct the evaluations, engineering, and construction of fish pass structures. Fish culture work and transfer of fry to the lake will be completed by PWSAC. We will also coordinate with PWSAC to make any necessary adjustments at the Main Bay Hatchery for accommodating additional incubation and short-term rearing. Additionally, the PWS/CR RPT will be involved in assessing opportunities and for developing strategies for the stocking program.

SCHEDULE

A. Measurable Project Tasks for FY99

Oct 98 - June 99:	PWSAC rears sockeye to fry at Main Bay.
Oct 98 – Dec 99:	USFS completes survey and final design of fish way.
Jan 99:	Attend Annual Restoration Workshop.
Jan 99 - April 99:	USFS prepares for field season award contracts for logistics.
Jan 99 – April 99:	USFS prepares and submits Annual Report and updated DPD.
June 99:	PWSAC releases second year of sockeye fry at Solf Lake.
May 99 – Sept 99:	ADF&G conducts limnological sampling and prepares report.
Aug 99:	PWSAC conducts egg take for FY00 stocking at Solf Lake.

B. Project Milestones and Endpoints

Feasibility/Planning Phase

Objective 1 was completed in FY96.

Objective 2 was completed in FY97.

Objective 3 was completed in FY97 then changed in FY98.

Objective 4 is partially complete. The FY97 work is complete and the FY98 work is on schedule.

Completion of the fish pass needs (survey and design) is scheduled in FY99 under this proposal. Once complete, all Feasibility/Planning objectives would be met.

Implementation Phase

Objective 1 requires 4 years to complete. Initial construction and design occurred in FY97. Further construction is scheduled in FY98. Final survey and design would occur under this proposal in FY99. The final construction phase would occur in FY00.

Objective 2 has been partially met. Eggs have been collected and are being reared at the Main Bay Hatchery, with fry to be released in FY98. This is the first year of stocking and should end in FY02.

Objective 3 will begin in FY98 and continue through FY03.

C. Completion Date

The project completion date will be at the end of FY03.

PUBLICATIONS AND REPORTS

Annual reports and an updated DPD will be submitted during each year of the project.

PROFESSIONAL CONFERENCES

At this time there are no plans to present this project at professional conferences. However, a poster board display is planned for presentation at the District Office and at science conferences.

NORMAL AGENCY MANAGEMENT

Given current budgets and agency priorities the opportunity to conduct this project under normal agency management either now or in the near future is unlikely. However, some aspects of the long term maintenance and monitoring of the project, may fall under the normal agency management of other similar structures in PWS. Shared cost proposals for each of the phases of construction and monitoring of this project will be presented in the future project work plans for the Forest Service but given budget fluctuations, secure funding is not a certainty.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

Initial coordination with ADF&G biologists in Cordova, with the Regional Planning Team, and

with PWSAC will continue throughout FY99 to address the mixed-stock fisheries and genetic risk issues that will influence the feasibility of this project.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

In the FY98 proposal we anticipated the final construction of the fish way to be complete in FY99. However, during the FY97 construction and survey season, a close inspection of the channel revealed highly fractured bedrock and deposition of rubble in the stream channel. With the channel de-watered, it became evident that a great deal of loose rock needed to be removed prior to any reasonable assessment for a feasible fish way design. Therefore, we are proposing to change the construction timing for the fish way to the year 2000. In FY99, hand crews will be required to clear this loose rock out of the channel allowing for a detailed survey and evaluation of the channel.

The amount requested in FY99 is $14.4 thousand less than in the FY98 proposal because there will be no construction that year. As a result of the difficult existing site conditions observed in FY97, it was necessary to increase our engineering costs, primarily due to additional salary needs. Additionally, the estimated cost for construction of the fish way in the year 2000 has increased over the 1998 proposal by $24.5 thousand due to the expected increase in rock work required during installation. The estimated cost for the fish way is highly uncertain at this point, and until a completed survey and design are finalized, cost associated with the construction estimates may change.

PROPOSED PRINCIPAL INVESTIGATOR

The principal investigator of this project is Daniel Gillikin (Fisheries Biological Technician; Glacier Ranger District). Dan will also provide technical support and field coordination of the seasonal employees assisting in data collection and construction for the project.

ADF&G is the cooperating agency on the project. Pat Shields, Fishery Biologist I, will be the principal investigator for the limnological and bathymetry work. Marsha Spafard, Fish and Game Technician III and Denise Cialek, Fish and Game Technician III, will assist in the data collection and laboratory analysis of the limnological data.

Dan Gillikin
Chugach National Forest
P.O. Box 129
Girdwood, AK. 99587
271-2348
271-3992 (FAX)

Patrick Shields
Limnology Laboratory (ADF&G)
3428 Kalifornsky Beach Rd. #8
Soldotna, AK 99669
262-9368
262-4709 (FAX)

PRINCIPAL INVESTIGATOR

Dan Gillikin, U.S. Forest Service Glacier Ranger District Chugach National Forest. Currently holds the position of Fisheries Technician on the Glacier District. He has eight years of experience as a fisheries technician with Private and Federal Agencies in Washington and Alaska.. He would work with the project manager and conduct project implementation, environmental compliance, agency coordination, budget management and reporting.

OTHER KEY PERSONNEL

Cliff Fox, U.S. Forest Service Glacier Ranger District Chugach National Forest. Resource Staff Officer on the Glacier District. Has 25 years experience in natural resource management with State and Federal Agencies in California, Idaho and Alaska. Has experience in project planning, implementation, and monitoring. Has multi-resource experience holding positions in fisheries, wildlife, timber, minerals, recreation, fire, real-estate, cultural resources, Forest Planning and environmental coordination. Presently oversees the District's fisheries, wildlife, timber, ecology, minerals and watershed programs. Would be responsible for project oversight during implementation, environmental compliance, agency coordination, budget management and reporting.

Cliff Fox
U.S. Forest Service
P.O. Box 129
Glacier Ranger District
Girdwood, AK 99587
(907) 783-3242
FAX: (907) 783-2094

LITERATURE CITED

ADF&G 1992. An atlas to the catalog of waters important for spawning, rearing or migration of anadromous fishes, South-central Region, Resource Management Region II. Alaska Dept. of Fish & Game. Anchorage.

Barto, D.L. and V.L. Nelson. 1982. Field data summary for Copper River and Prince William Sound lake investigations, 1982. Prince William Sound Aqua. Corp. Cordova. 268 pp.

Blanchet, D. 1983. Chugach National Forest Environmental Atlas. USDA Forest Service, Alaska Region. Report number 124.

Hankin, D.G and G.H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Can. J. Fish. Aquat. Sci., Vol. 45: 834-844.

Koenings, J.P.; J.A. Edmundson; G.B. Kyle and J.M. Edmundson. 1987. Limnology field and laboratory manual: Methods for assessing aquatic production. Alaska Dept. of Fish & Game. FRED Division Report number 71. 212 pp.

Kyle, G.B. 1990. Summary of acoustically derived population estimates and distributions of juvenile salmon (Oncorhynchus nerka) in 17 lakes of Southcentral Alaska, 1982-1987. Alaska Department of Fish and Game. FRED Division Report Series 104:47 pp.

Nickerson, R. 1978. Identification of fish hatcheries, aquaculture sites, habitat & species enhancement projects in Prince William Sound. Alaska Dept. of Fish and Game. Cordova.

Pellissier, R.F. and M.A. Somerville. 1987. Field data summary for Copper River and Prince William Sound lake investigations, 1985. ADF&G contract no. 85-0159. 149pp

PWSRPT. 1983. Prince William Sound - Copper River comprehensive salmon plan, phase I - 20 year plan (1983-2002). Prince William Sound Regional Fisheries Planning Team. Cordova. 176 pp.

PWSRPT. 1983. Prince William Sound - Copper River comprehensive salmon plan, phase II - 5 year plan (1986-1991). Prince William Sound Regional Fisheries Planning Team. Cordova. 236 pp.

Seitz, J. and J.A. Fall. 1995. Tatitlek. In: Fall, J.A and C.J. Utermohle, (eds). *An investigation of the sociocultural consequences of outer Continental Shelf development in Alaska; II. Prince William Sound.* MMS 95-011; Technical Report No. 160.

Seitz, J. and R.Miraglia. 1995. Chenega Bay. In: Fall, J.A and C.J. Utermohle, (eds). *An investigation of the sociocultural consequences of outer Continental Shelf development in Alaska; II. Prince William Sound.* MMS 95-011; Technical Report No. 160.

Wetzel, R.G. and G.E. Likens. 1979. Limnological Analyses. W.B. Saunders Company, Philadelphia, PA. 357 pp.

PERSONAL COMMUNICATIONS

Holbrook, K., US Forest Service, Anchorage. August 1995.

Jackson, M., Fish and Game Technician (retired). Alaska Dept. of Fish and Game. Cordova. April, 1995.

Kyle, G.B., Limnologist, Alaska Department of Fish and Game. Division of Commercial. Fisheries. Management and Development. Soldotna. 4-25-95; 4-2-96.

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999	PROPOSED FY 1999 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
				$39.1		$29.1		
Personnel	$42.3	$44.4						
Travel	$0.0	$0.8						
Contractual	$18.0	$9.7						
Commodities	$16.6	$6.1						
Equipment	$1.2	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$78.1	$61.0		Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
General Administration	$7.7	$7.3						
Project Total	$85.8	$68.3		$105.0	$72.5	$53.1		
Full-time Equivalents (FTE)	1.2	1.1						
	Dollar amounts are shown in thousands of dollars.							
Other Resources	$0.0	$0.0		$0.0	$0.0	$0.0		

Comments: This is a continuation of project 98256B between the US. Forest Service and the Alaska Department of Fish and Game.

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Lead Agency: USFS

FORM 2A
MULTI-TRUSTEE
AGENCY
SUMMARY

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$42.3	$18.7
Travel	$0.0	$0.4
Contractual	$18.0	$6.3
Commodities	$16.6	$0.6
Equipment	$1.2	$0.0
Subtotal	$78.1	$26.0
General Administration	$7.7	$3.2
Project Total	$85.8	$29.2
Full-time Equivalents (FTE)	1.2	0.5
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

	Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
	$68.0	$33.5	$13.1		

Dollar amounts are shown in thousands of dollars.

Comments:

The the 1999 proposed budget provides for; Detailed survey of the eastern outlet and fishway design. Additional labor is required to "muck out" the stream channel to allow for a close inspection of the channel substrate. Inspection of the channel in 1997 reveled the need for a more detailed survey and design.

Cost estimates for the year 2000 include installation of the fishway and are only estimated.

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: USFS

FORM 3A
TRUSTEE
AGENCY
SUMMARY

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 1999
Rob Spangler	Fish Biologist	GS-9	1.0	4.2		4.2
Dan Gillikin	Fish Technician	GS-9	1.5	3.5		5.3
Unknown	Engineer	GS-11	1.0	4.4		4.4
Seasonal	Technician	GS-7	1.0	3.0		3.0
Seasonal	Technician	GS-5	1.0	1.8		1.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		5.5	16.9	0.0	
					Personnel Total	$18.7

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 1999
					0.0
Train Tickets Passenger	0.02	12			0.24
Train Ticket Truck	0.05	3			0.15
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.4

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: USFS

FORM 3B
Personnel
& Travel
DETAIL

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:	Proposed
Description	FY 1999
Egg Take, Incubation , Marking and Release PWSAC Contract at Main Bay Facility	3.9
Charter flights (4 RT at $600/flight)	2.4
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$6.3

Commodities Costs:	Proposed
Description	FY 1999
Field per diem (4 crew for 8 days at $18/day)	0.6
Commodities Total	$0.6

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: USFS

FORM 3B
Contractual & Commodities DETAIL

Prepared: 4/8/98

4/15/98

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
None			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
Those purchases associated with replacement equipment should be indicated by placement of an R.	**New Equipment Total**		$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Forest Service Landing Craft or other Vessels (not purchased through EVOS) will be contributed to the project. Daily use rates for the landing craft averages $200/day.		

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: USFS

FORM 3B
Equipment
DETAIL

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel		$25.7
Travel		$0.4
Contractual		$3.4
Commodities		$5.5
Equipment		$0.0
Subtotal	$0.0	$35.0
General Administration		$4.1
Project Total	$0.0	$39.1
Full-time Equivalents (FTE)		0.6
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

	Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
	$37.0	$39.0	$40.0		

Dollar amounts are shown in thousands of dollars.

Comments:
This provides for the collection and analysis of 10 zooplankton samples at Solf Lake over the 5 trips during the 1999 field season.
This also includes monitoring smolt out migration at Solf Lakes eastern outlet.

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: ADFG

FORM 3A
TRUSTEE
AGENCY
SUMMARY

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 1999
Pat Shields	FB2	16D	1.7	4.9		8.3
Lab Tec			1.3	3.0		3.9
Field Tech #1			2.5	3.0		7.5
Field Tech #2			2.0	3.0		6.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		7.5	13.9	0.0	
					Personnel Total	$25.7

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 1999
Train Tickets Passenger	0.02	12			0.2
Train Ticket Truck	0.05	3			0.2
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.4

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: ADFG

FORM 3B
Personnel
& Travel
DETAIL

Prepared: 4/15/98

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Contractual Costs:	Proposed
Description	FY 1999
Air Charter ($340/hr for 10 hrs.)	3.4
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$3.4

Commodities Costs:	Proposed
Description	FY 1999
Camp Supplies	1.8
Per Diem (2 crew for 40 days @ $18/day)	1.4
Wier equipment	2.0
Misc. Lab supplies	0.3
Commodities Total	$5.5

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: ADFG

FORM 3B
Contractual & Commodities DETAIL

Prepared: 4/15/98

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
USFS Landing Craft will provide some logistic support as part of the USFS contributions to the project.		

1999

Project Number: 99256B
Project Title: Sockeye Salmon Stocking; Solf Lake
Agency: ADFG

FORM 3B
Equipment
DETAIL

Project Title: Assessment, Protection and Enhancement of Wildstock Salmon Streams in the Lower Cook Inlet.

Project Number:	99263
Restoration Category:	General Restoration.
Proposer:	Port Graham Corporation
Lead Trustee Agency:	ADF&G
Cooperating Agencies:	None
Alaska SeaLife Center:	No
Duration:	FY99 to FY2001
Cost FY 99	$67.2.
Cost FY 00	$23.5.
Geographic Area:	Port Graham Corporation lands on the eastern and southern coasts of the Kenai Peninsula—specifically Scurvy Creek, Windy Creek, Rocky River and Port Graham.
Injured Resource/Service:	Replacement of Lost Subsistence Services.

RECEIVED
APR 15 1998
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

ABSTRACT

This project will replace lost subsistence services resulting from the *Exxon Valdez* oil spill by constructing enhancement projects on the major salmon streams in the Lower Cook Inlet (LCI) oil spill area during Years Two, Three and Four. Protection and Enhancement projects will be implemented using instream fisheries habitat improvement techniques, primarily creation of spawning channels, removing natural barriers to spawning and wall-based rearing structures. PGC management with advice from an ADF&G fisheries specialist, will supervise the project and coordinate with a professional fisheries scientist and resource consultants. Local subsistence users will be employed as technical assistants during the field survey and during construction of the habitat improvement structures.

INTRODUCTION

Subsistence users in the LCI area and specifically the residents of Port Graham are heavily dependent on these four major salmon streams and the salmon they produce for subsistence needs. These major salmon streams and their tributaries were inventoried and evaluated in FY97.

Year One of this project for FY 97 consisted of habitat surveys. Standardized fisheries habitat survey techniques developed by ADF&G and the USDA Forest Service were used. From these surveys, appropriate prescriptions for structural improvement were then proposed based upon the species and the objectives desired for that stream. We proposed six individual projects on three streams. Of these, two were approved for funding by the EVOS Trustee Council in two phases. Phase One consists of permitting, environmental assessment and preliminary engineering. Phase Two consists of final engineering, construction and monitoring.

In FY98 site specific protection and restoration projects are being implemented from the field inventories completed in FY 97. A fish pass on Port Graham River and rearing ponds on Windy Creek Left were approved for funding in FY98. These projects are primarily targeting coho, pink,and chum salmon and possibly sockeye salmon for habitat enhancement.

Additional construction and enhancement projects are proposed during FY 99 and FY00 for Years Three and Four of 97263. Planting vegetation around the rearing ponds on Windy Creek Left for additional cover coho salmon fry and smolts is proposed for FY99. In addition,Year Three will consist of monitoring the success of the Year Two construction projects for success. We propose to conduct salmon run surveys on the Port Graham River, above and below the falls on weekly basis during the salmon spawning season. In addition, we will conduct fry and smolt surveys of the Windy Creek Left rearing ponds using the appropriate techniques. Hand tools and manual labor will be utilized extensively by the local subsistence users for much of the work proposed in FY99.

The emphasis on employing local subsistence users for this project will provide for the high quality protection and enhancement of these valuable resources by the owners and stewards of the land and the users of the subsistence resource.

NEED FOR THE PROJECT

A. Statement of Problem

The loss of traditional subsistence resources and services has been extensively documented in this area. Some subsistence resources may never recover to their pre-oil spill levels. There is a need to substitute and increase the subsistence resources for the residents of LCI using the existing wildstocks of pink, coho and chum salmon. Subsistence harvests remain depressed compared to pre-spill levels. Other species damaged or impacted by the oil spill which would benefit from this project include the marbeled murrelet, the black oyster catcher, the river otter and the harlequin duck. Subsistence will be deemed to be recovered when the local residents have restored confidence of the abundance and safety of this important resource and service This project seeks to replace lost or damaged resources by replacing or enhancing the habitat of wildstocks of salmon important to the people who live in Lower Cook Inlet.

B. Rationale/Link to Restoration

The inventory and assessment of these major salmon producing streams and lakes done in FY

97 provided the information necessary for the construction of habitat protection and enhancement projects on these streams in FY98. This in turn will increase the salmon runs and therefore increase the available subsistence resources. It will compensate and substitute for the damaged and lost resources available to subsistence users in the LCI. The protection and enhancement of these streams will not only aid the subsistence users but also the impacted commercial and sport users. The monitoring and additional enhancement projects will ensure the success of these projects.

The policy of the Trustee Council, as stated in the Restoration Plan, is that projects designed to restore or enhance an injured resource: 1) must have a sufficient relationship to the injured resource 2) must benefit the same user group that was injured 3) should be compatible with the character and public uses of the area. This project meets all three portions of the Trustee Council's policy toward restoring or enhancing an injured resource.

C. Location: Lower Cook Inlet

These streams are located in Port Graham drainage and Kachemak Bay, Windy Bay, Rocky Bay on the Kenai peninsula. The project benefits will be felt in the entire Lower Cook Inlet region.

COMMUNITY INVOLVEMENT

This project will have upwards of 60 percent direct involvement of Port Graham residents and other local subsistence users. This project will be the direct responsibility of PGC. Through the training of PGC people for the field and office work, the depth of understanding of the streams and the fisheries resource will be enhanced. This will develop an awareness of the needs for protection and enhancement of these valuable resources.

Port Graham, Nanwalek and Seldovia residents will be consulted as to their local knowledge of these streams and their historic levels of spawning return. Local hire for field work will be used extensively. Study area is remote, extensive use of locals boats and housing will be required. Subsistence use will be inventoried and assessed for pre and post spill utilization.

PROJECT DESIGN

A. Objectives

1. Monitor the use and success of the in-stream spawning and rearing habitat improvement projects constructed in FY98 for Coho, Pink and Chum salmon.

2. Continue to enhance existing wildstocks of salmon to serve as substitution and compensation for the lost and damaged subsistence resources important to the subsistence users of Lower Cook Inlet.

3. Educate and involve the subsistence users in the concepts of fisheries management and wise land stewardship.

4. Update existing information on wildstock salmon habitat from weekly salmon

stream surveys. Enter relevant data into a data base for future management decisions.

5. Evaluate escapement levels of salmon returns to Port Graham River and Windy Creek Left. Goal is to build salmon runs to near biological capacity with enhanced habitat.

6. Improve quality and quantity of wildstock salmon as a subsistence resource in the LCI. Gauge success by comparing returns in next ten years with historic averages.

7. Discuss and coordinate with Federal, State and local agencies. Ensure NEPA compliance. Obtain permits for any additional enhancement projects.

B. Methods

Field: Instream restoration and enhancement will occur during the early summer of 1999. Most salmon in these streams have runs which occur in the late summer to fall and this timing would avoid conflicts with not only the salmon but with the subsistence harvest. Enhancement projects will be coordinated with the ADF&G. It is anticipated that with the excellent road access and the availability of heavy equipment, that PGC will be able to implement these projects on a cost effective basis. Work crews will be necessary for most projects and will consist of four to five individuals. Projects will include: planting cover for rearing ponds to further enhance the available rearing habitat.

Future monitoring will be critical to assess the rate of success and to determine which objectives have been met or exceeded. Monitoring will continue for ten years conducted by PGC. Final reports and data will be compiled in FY 2001.

C. Cooperating Agencies, Contracts and Other Agency Assistance

ADF&G will be the lead trustee agency. ADF&G will then contract through KPB-EDD who will then contract with the Port Graham Corp. for the entire project. Cooperation will be needed with the EPA for any NEPA compliance necessary and KPB for Coastal Zone Management AMSA Compliance. EA's will be prepared under ADF&G direction. Contracts for heavy equipment or boats, if necessary will be through the Port Graham Corp. Technical assistance from the Alaska Dept. of Fish and Game will be required and sought for all phases of this project. Salmon run surveys will be coordinated with ADF&G COMFISH utilizing their existing surveys for pink and chum salmon.

SCHEDULE

A. Measurable Project Tasks for FY 1999

October 1—December:	Review information & data from Years One & Two Coordinate project with ADF&G and USDA Forest Service. Field review current construction projects. Develop plans for Year Three.
January—May 15:	Develop final enhancement plan. Arrange for field crews. Field review projects. Plan maintenance projects as needed.
May 15—July 1:	Maintain Port Graham River Fish Pass, repair or improve if needed. Plant willow & alders around Windy Creek Left Rearing Ponds. Monitor use of rearing ponds by coho fry and smolt.
Aug 15 — October 15:	Conduct salmon run surveys on Port Graham River. Coordinate with COMFISH.
October 15:	Annual report prepared. Prepare field construction plan for additional enhancement projects for FY 2000.

B. Project Milestones and Endpoints

May 1998:	Revisit selected areas designated for development, protection and enhancement projects. Evaluate proposed projects for FY2000
October 1998:	Complete salmon run surveys for 1998.
December 1998:	Develop project plans for enhancement and protection projects for EVOS funding in FY2000.
April 1999 :	Finalize plan for any additional enhancement projects.
April-August 2000	Update Year Four of Enhancement Projects and inventory returns on Year Two and Three projects.

C. Completion Date

September 2000:	Complete final report and submit for peer review.

Proposed Enhancement Projects:

Rearing Ponds Enhancement: Plant willows and alders for to provide cover for coho fry and smolt in the rearing ponds on Windy Creek Left constructed in FY98.

PUBLICATIONS AND REPORTS

Annual Reports: Annual Reports will be prepared for each FY. The survey reports, database and accompanying maps will be delivered to ADF&G upon their completion. The final report will be prepared in FY 2000 and will emphasize the subsistence resource enhancement success of this project.

PROFESSIONAL CONFERENCES

The project results will be presented at the appropriate EVOS conferences and technical sessions and other conferences.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project will be coordinated with all previous and ongoing ADF&G and PGC/EVOS Projects. Coordination between the Port Graham Corporation, the Port Graham Village Council, ADF&G and the KPB-EDD will be critical for the success of this project.

PROPOSED PRINCIPAL INVESTIGATOR

This project will be organized and managed by the following agencies and entities: Walter Meganack, Jr. will be the principal investigator under the direction of the management of the Port Graham Corporation.

Trustee Agency: Alaska Dept. of Fish & Game

ARDOR: Kenai Peninsula Borough
Economic Development District
Will be the state contracting agency

Contractor: Port Graham Corporation
Patrick Norman-President
Walter Meganack, Jr.-Project Manager
P.O. Box 5569
Port Graham, Alaska 99603-5569

PERSONNEL

Overall project management will be under the direction of Walter Meganack, Jr. and Pat Norman of the Port Graham Corp.

John L. Hall & Arvid J. Hall of Taiga Resource Consultants will work under PGC as assistant managers and provide technical advice.

Dr Douglas Martin, Fisheries Biologist will provide technical expertise.

LITERATURE REVIEW

Carpenter, Dickson, et al. 1995,
Exxon Valdez Oil Spill State/Federal Natural Resource Damage Assessment Final Report. Survey and Evaluation of Instream Habitat and Stock Restoration Techniques for wild Pink and Chum Salmon.
Alaska Department of Fish and Game.

Martin, 1996. Fish Habitat and Channel Conditions for Streams on Forested Lands of Coastal Alaska: An Assessment of Cumulative Effects.
Pentec Environmental.

Regional Interagency Executive Committee 1995,
Ecosystem Analysis at the Watershed Scale: Federal guide for Watershed Analysis, Version 2.2. U.S. Government Printing Office.

Stanek, 1985. Patterns of Wild Resource Use in English Bay and Port Graham, Alaska. Alaska Department of Fish and Game.

Sundet & Kuwada, 1994. Stream Habitat Assessment Project: Prince William Sound and Lower Kenai Peninsula, Project No. R-51. Exxon Valdez Trustee Council Restoration and Habitat Protection Planning. Alaska Department of Fish and Game.

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Budget Category	Authorized FY 98	Proposed FY 99
Personnel	$.0.	$.0.
Travel	$.0.	$.0.
Contractual	$100.0.	$62.8.
Commodities	$.0.	$.0.
Equipment	$.0.	$.0.
Subtotal	$100.0.	$62.8.
ADF&G (7%)	$7.0.	$4.4.
Subtotal	$107.0.	$67.2.
Total	$107.0.	$67.2.
Full-time (FTE)		$.0.
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003	
$23.5	$22.5	$.0	$.0	$.0

Dollar amounts are shown in thousands

Comments:

- Administrative cost for the contractor, Kenai Peninsula Borough Economic Development District is 10% of the project costs.

1999

Project Number: 99263
Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement
Trustee: ADF&G

FORM 3A
TRUSTEE
AGENCY
SUMMARY

Personnel Costs			Months Budgeted	Monthly Costs	Overtime	Proposed FY 1999
Name	**Position Decription**					
			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.
	Subtotal		0	0	0	
					Personnel Total	$0.0.

Travel Costs	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1999
Description					
					$0.0.
					$0.0.
					$0.0.
					$0.0.
					$0.0.
					$0.0.
Subtotal					
				Travel Total	$0.0.

1999

Project Number: 99263
Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement
Name: Port Graham Corporation

FORM 3B
Personnel
& Travel
Detail

New Equipment Purchases:	Number of Units	Unit Price	Proposed FFY 1999
Description:			
		$0.0.	$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
Those purchases associated with replacement equipment should be indicated by the placement of an R.		New Equipment Total:	$0.0.

Existing Equipment Usage:		Number of Units	Proposed FFY 1999
Description			
	0	0	
			0

1999

Project Number: 99263
Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement
Trustee: ADF&G

Form 3B
Equipment
DETAIL

Contractual Costs:	Proposed FFY 1999
Description:	
Contract with Kenai Peninsula Borough Economic Development District	$62.8.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
Contractual Total	$0.0.
	$62.8.

Commodities Cost	Proposed FFY 1999
Description	
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
Commodities Total	$0.0.

1999	**Project Number: 99263** **Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement** **Trustee: ADF&G**	Form 3B Contractual &Commodities DETAIL

1999 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1998 - September 30, 1999

Budget Category	Authorized FY 98	Proposed FY 99
Personnel	$.0.	$10.2.
Travel	$.0.	$2.4.
Contractual	$90.9.	$39.0.
Commodities	$.0.	$5.0.
Equipment	$.0.	$.5.
Subtotal	$90.9.	$57.1.
Indirect	$9.1.	$5.7.
Subtotal	$100.0.	$62.8.
Total	$100.0.	$62.8.
Full-time (FTE)		$.0.
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003	
$23.5	$22.5	$.0	$.0	$.0

Dollar amounts are shown in thousands

Comments:

• KPB-EDD will receive%10 for indirect

1999

Project Number: 99263
Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement
Name: Port Graham Corporation

FORM 4A
NON-TRUSTEE
SUMMARY

Personnel Costs			Months Budgeted	Monthly Costs	Overtime	Proposed FY 1999
Name	**Position Decription**					
Walter Meganack, Jr.	Project Management		1.2	7.5	0	$9.0.
			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.
TBN	Admininstrative Support		1	1.2	0	$1.2.
		Subtotal	1	1.2	0	
					Personnel Total	$10.2.

Travel Costs	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FY 1999
Description					
RT PG-Homer	$60	6	10	$50	$0.9.
RT PG-Anchorage	$180	4	8	$100	$1.5.
	$0	0	0	$0	$0.0.
			0	$0	$0.0.
					$0.0.
					$0.0.
Subtotal		10	18	100	
				Travel Total	$2.4.

1999

Project Number: 99263
Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement
Name: Port Graham Corporation

FORM 4B
Personnel
& Travel
Detail

New Equipment Purchases:	Number of Units	Unit Price	Proposed FY 1999
Description:			
Field Equipment	1	$0.5.	$0.5.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
			$0.0.
Those purchases associated with replacement equipment should be indicated by the placement of an R.		New Equipment Total:	$0.5.

Existing Equipment Usage:		Number of Units	Proposed FY 1999
Description			
None			
	0	0	
			0

1999

Project Number: 99263
Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement
Name: Port Graham Corporation

FORM 4B
Equipment
DETAIL

Contractual Costs:	Proposed FY 1999
Description:	
Contract with TRC for Port Graham Fish Pass Monitoring and Repair	$15.5.
Contract with TRC for Windy Creek Left Rearing Ponds Monitoring	$6.5.
Contract with TRC for Revegation Plan and Planting of Rearing Ponds	$12.0.
Contract with TRC for Preparation of Annual Report	$5.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
Contractual Total	$0.0.
	$39.0.

Commodities Cost	Proposed FY 1999
Description	
Office supplies & postage	$0.5.
Plants & materials	$4.5.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
	$0.0.
Commodities Total	$5.0.

1999	Project Number: 99263 Project Title: PGC Wildstock Salmon Stream Assessment & Enhancement Name: Port Graham Corporation	Form 4B Contractual &Commodities DETAIL

Project Title: **Scoter and Goldeneye Life History and Ecology: Linking Satellite Technology with Traditional Knowledge to Conserve the Resource.**

RECEIVED
APR 15 1998
EXXON VALDEZ OIL SPILL
TRUSTEE COUNCIL

Project Number:	99273
Restoration Category:	Subsistence, Research
Proposer:	Dan Rosenberg Alaska Dept. of Fish and Game 333 Raspberry Road Anchorage, Alaska 99503
Lead Trustee Agency:	ADFG
Cooperating Agencies:	DOI
Alaska SeaLife Center:	No
Project Duration:	2nd year, 3-year project
Cost FY 99:	$237,600.
Cost FY 00:	$240,000.
Cost FY 01:	$NA
Cost FY 02:	$NA
Geographic Area:	Prince William Sound, Lower Cook Inlet
Injured Resource/Service:	Subsistence; intertidal community.

ABSTRACT

This project will study the life history and ecology of surf scoters (*Melanitta perspicillata*) and Barrow's Goldeneyes (*Bucephala islandica*) that over winter in, or migrate through Prince William Sound (PWS) and lower Cook Inlet (LCI). This information will be integrated with traditional ecological knowledge. Scoter and goldeneye populations in Alaska are declining. Communities in PWS and LCI harvest scoters and goldeneyes for subsistence purposes. Scoters are among the least studied of North American waterfowl and little is known of their life history, ecology, and distribution. The nesting and molting distribution of Barrow's goldeneyes wintering in PWS is unknown. Scoters and Barrow's goldeneyes will be marked with surgically implanted satellite transmitters to define the breeding areas, molting areas, and wintering areas. Local participation will be solicited and information will be conveyed to local residents through the Chugach School District and Youth Area Watch programs.

INTRODUCTION

This project will study the life history and ecology of surf scoters (*Melanitta perspicillata*) and Barrow's goldeneyes (*Bucephala islandica)* that winter or migrate through Prince William Sound (PWS) and lower Cook Inlet (LCI) and integrate this information with traditional ecological knowledge collected from community members within the study area. In the first year (FY98) we initiated (April 1998) a pilot project to test the feasibility of catching scoters in PWS and marking ten birds with surgically implanted satellite transmitters. Satellite telemetry will allow us to define the breeding areas, molting areas, and wintering areas of this subsistence resource. In FY99 we propose to mark fifteen additional surf scoters and five Barrow's goldeneyes with satellite transmitters. Information will be conveyed to residents of Tatitlek, Chenega, Port Graham, and Nanwalek. In Tatitlek and Chenega we will work with the Chugach School District and Youth Area Watch programs. The participation of community members, primarily students, in the capture and monitoring of these seaducks will be solicited. We also propose to collect ecological information on breeding and molting sites, monitor birds for contaminants, and collect more information on wintering sites and migration routes.

Residents of the communities affected by the *Exxon Valdez* Oil Spill remain concerned about the abundance and safety of their traditional food resources (*Exxon Valdez* Oil Spill Trustee Council, 1996). In 1993, 55% of the households in Tatitlek reported using scoters harvested for subsistence purposes, as did 40% of the households in Nanwalek and almost 12% of Port Graham households (Scott et al. 1996). Since 1977, scoters in Alaska have been estimated to decline by as much as 40% (Hodges et al. 1996), although since the *Exxon Valdez* oil spill, the number of scoters is increasing in PWS in March (Agler and Kendall 1977). USFWS breeding pair survey methods (Hodges et al. 1996), may not accurately monitor scoter populations. Individual species are not recorded in either survey. Declines in breeding pair surveys may be a function of survey timing and regional trends (USFWS 1998).

Goldeneyes, harvested for subsistence purposes, were used by 12% of the households in Tatitlek and Chenega Bay in 1993, and 25% of the households in Nanwalek and Port Graham (Scott et al. 1996). From 1977 to 1994, Goldeneye numbers in Alaska (Barrow's and Common collectively) declined by an estimated 45% (Hodges et al. 1996). As with scoters, individual species are not recorded, and population declines may be a function of regional trends, with some regions of the state declining while others remain stable (USFWS 1998).

Scoters are among the least studied of North American waterfowl (Godfrey 1989, Savard and Lamothe 1991, Henny et al. 1995). Little is known of their life history, ecology, and breeding, wintering, and molting distributions (Bellrose 1976; Herter et al. 1989; Goudie et al. 1994). Surf scoters, black scoters (*M. nigra*), and white-winged scoters (*M. fusca*) all occur in PWS and lower Cook Inlet. Among these, the surf scoter is the most abundant (Isleib and Kessel 1973). It occurs as both a year-round resident and migrant. Surf scoters are most numerous in spring due to the influx of migrants probably in response to spawning Pacific herring (*Clupea pallasi*) (Isleib and Kessel, 1973; Bishop et al. 1995). Nonbreeders remain in PWS in summer.

Most scoters depart PWS in spring to unknown nesting areas, perhaps in interior Alaska and the Yukon (Gabrielson and Lincoln 1959), and as far north as the Mackenzie Delta and the Brooks Range (Johnson and Richardson 1982). Male seaducks abandon incubating females in early summer and congregate at communal molting sites (Salomonsen 1968). Often these areas are distinct from nesting or wintering areas. As with other waterfowl, wing feathers are lost simultaneously, rendering birds flightless for about one month until new feathers emerge.

In winter, surf scoters feed in intertidal and subtidal zones, areas susceptible to contaminants (Vermeer and Peakall 1979). They feed primarily on bivalves, especially mussels, but in spring they may switch to a diet composed primarily of herring roe (Vermeer 1981; Goudie et al. 1994; Bishop et al. 1995). White-winged scoter die-offs occurred in the Cape Yakataga area in southeast Alaska during 1990-1992 (Henny et al. 1995). Although no definitive cause could be identified, elevated levels of cadmium were detected in the birds, but no source of contamination could be identified. The difficulty of detecting a source of contamination was confounded by lack of specific information on breeding, molting, or wintering areas.

Both Barrow's and common (*Bucephala clangula*) goldeneyes occur in PWS and lower Cook Inlet, most commonly as migrants and winter residents. Barrow's goldeneyes are the more numerous of the two species (Isleib and Kessel 1973; Agler et al. 1995). Their breeding distribution in Alaska is uncertain, though they are believed to primarily nest in southern and eastern Alaska, south of the Alaska Range and northwestern Canada (Johnsgard, 1975; Conant and Groves, 1995). In summer, some Barrow's goldeneyes nest in PWS, otherwise only a small percentage of the winter population is present. Molting sites are unknown.

Barrow's goldeneyes, wintering along the coast, feed primarily in intertidal zones. These areas in western PWS were heavily exposed to oil from the *TV Exxon Valdez.* Like scoters, they feed primarily on bivalves, especially mussels (*Mytilus spp.*), but in spring, they too switch to a diet composed primarily of herring roe (Vermeer 1982; Koehl et al. 1984; Beauchamp 1992). Cytochrome P450 induction was elevated in Barrow's goldeneyes captured in 1997 in western PWS (Dan Esler, USGS, BRD, pers. comm). Cytochrome P450 activity indicates exposure to hydrocarbons.

Barrow's goldeneye populations have remained stable in oiled areas of PWS since the spill, but have been increasing in unoiled areas (Agler and Kendall 1997). It is unknown whether this geographic difference is due to contaminants, geography, or other biotic and abiotic factors. Declines in Barrow's goldeneyes, wintering around Kodiak Island, were observed following the *Exxon Valdez* Oil Spill (Zwiefelhofer and Forsell 1995). Declines have also been reported in coastal British Columbia (Goudie et al. 1994.)

Sea ducks are among the species most vulnerable to mortality from oil spills (Piatt et al. 1990). Further compounding any direct mortality from the spill, is contamination or reduction of the principal food resources of scoters and goldeneyes. Mussels and intertidal sediments in PWS showed increases in petroleum hydrocarbon concentrations directly attributable to *Exxon Valdez* oil (Short and Babcock 1996), and oil in mussel beds in PWS and the Kenai Peninsula persisted for several years after the spill (Babcock et al. 1996). Further, the PWS herring stocks suffered a

dramatic decline in 1993 and stocks have remained depressed (Morstad et al. 1997). Quite likely, any decline results from a combination of factors such as habitat loss, contaminants, or climate change. Several studies have shown scoters and other sea ducks to bioaccumulate trace metals and organochlorines from their environment (Vermeer and Peakall 1979; Henny et al. 1991; Olendorf et al. 1991; Henny et al. 1995).

Human activities, such as hydroelectric development (Savard and Lamothe 1991), estuarine pollution (Ohlendorf et al. 1991), or introductions of exotic species (Bordage and Savard 1995) on the breeding, wintering, or molting areas potentially have profound affects on abundance or distribution of a population. Goldeneyes, which are secondary cavity nesters, are further threatened by the logging of trees in nesting areas (Canadian Wildlife Service et al. 1997). The recent spruce bark beetle outbreak in southcentral Alaska may significantly affect nesting habitat. The lack of information on distribution and migration patterns can prevent the identification of potential harmful environmental exposures or alterations and make it extremely difficult to determine possible causes of population declines. Location of breeding grounds, migration routes, and timing of migration are important factors used to evaluate contaminant uptake or loss in a migratory species as well as changes to food resources and other environmental changes (Henny et al. 1991). Nesting is considered one of the weakest links in the life cycle, especially with regard to contaminant effects (Henny et al. 1995).

Scoters and Barrow's goldeneyes are an important subsistence resource to the people living in the communities of PWS and LCI. These species of seaducks comprise the large majority of the sea duck harvest in the communities of Tatitlek, Chenega Bay, Port Graham, and Nanwalek (Scott et al. 1996). Population trends in scoters and goldeneyes are uncertain, but appear to be declining in some regions, while remaining stable, or increasing in others. Affiliations between breeding and wintering areas are unknown, compounding meaningful integration of survey data. The susceptibility of seaducks to contaminants is a concern to resource managers and subsistence consumers. We propose a program that will integrate traditional knowledge, scientific methods, and modern technology to perpetuate the subsistence patterns of these communities. This will be accomplished through greater understanding of surf scoter and Barrow's goldeneye life history and ecology, sharing knowledge with local community members, involving the youth of the communities in the restoration process, and improving conservation strategies for this species.

Little is known about the ecology, breeding areas, molting areas, and migration routes of these two species. Basic reproductive ecology information is lacking for sea duck populations wintering in PWS. Determination of breeding distribution is the first step in assessing breeding ecology. Potential breeding sites range throughout Alaska and the Yukon Territory. Once satellite telemetry has defined breeding and molting areas, we propose to define habitat associations, measure productivity, and census birds at molting sites. If we can obtain adequate sample sizes and scoters exhibit philopatry to winter and molting areas, mark and recapture data will be analyzed to estimate annual survival rates by age and sex (Lebreton et al. 1992).

Black scoters and white-winged scoters are also an important subsistence resource to communities in PWS and LCI (Scott et al. 1996). In subsequent years, we will attempt to incorporate these species into our study if funding allows. However, due to the large numbers of

surf scoters and Barrow's goldeneyes wintering and migrating through PWS and their importance in the subsistence economy, we have chosen to study these species at the present time.

This project is integrated with project \052B Traditional Ecological Knowledge, project \210 Youth Area Watch, project \025 Nearshore Vertebrate Predator Project, \320 Predation on Herring Spawn, project \427 Harlequin Duck Recovery Monitoring, project \159 Prince William Sound Marine Bird Surveys, and proposed project 99426-Harlequin Duck Population Dynamics.

NEED FOR THE PROJECT

A. Statement of Problem

Surf scoters

Native inhabitants of PWS have used surf scoters as a subsistence resource for centuries. Along with black scoters and white-winged scoters, surf scoters are the most abundant avian species found at archeological sites (Linda Yarborough, USFS, pers. comm). Among the three species of scoters in PWS, surf scoters are the most abundant in winter (Dan Esler, USGS-BRD, pers. comm.). However, little is known about the distribution or movements of these birds within or outside of PWS. Although surf scoters are known to breed throughout much of Alaska and Canada (Gabrielson and Lincoln 1959; Godfrey 1986) nothing is known about specific populations and the link between winter, breeding, and molting areas. The few studies that have identified molting sites have not made the link between these and winter and breeding areas (Johnson and Richardson 1982; Dau 1987).

In marine environments, scoters feed on bivalves, especially blue mussels (*Mytilius edulis*), species known to concentrate contaminants. Herring roe, another important food source has become less abundant, as herring stocks have recently declined in PWS. As mentioned, scoters are known to bioaccumulate contaminants and die-offs have occurred, including several among white-winged scoters at Cape Yakataga, in southeast Alaska (Henny et al. 1995). The cause of this die-off was undetermined. In addition, scoters are susceptible to environmental changes and habitat alterations over their entire range. As scoters have different winter, breeding, and molting areas they are susceptible to changes over a wide geographic area.

Barrow's goldeneyes

Barrow's goldeneyes are also an important subsistence resource to native inhabitants of PWS. Goldeneyes and gulls are the second most abundant avian species found at archeological sites in PWS (Linda Yarborough, USFS, pers. comm). Little is known about the distribution or movements of these birds within or outside of PWS. Although goldeneyes breed throughout a large portion of eastern Alaska and western Canada (Johnsgard, 1975; Conant and Groves, 1995) nothing is known about specific populations and the link between winter, breeding, and molting areas.

Although Barrow's goldeneye populations have remained stable in oiled areas of PWS since the spill, goldeneye numbers in Alaska (Barrow's and Common collectively) have declined (Hodges et al. 1996). Barrow's goldeneyes, wintering along the coast, feed primarily in intertidal zones. These areas in western PWS were heavily exposed to oil from the *TV Exxon Valdez.* Like scoters, they eat bivalves, especially mussels (*Mytilus spp.*), but in spring, they too switch to a diet of herring roe (Vermeer 1982; Koehl et al. 1984; Beauchamp 1992). Recent studies indicate that goldeneyes continue to be exposed to hydrocarbons in western PWS (Dan Esler, USGS, BRD, pers. comm).

Because little is known about their ecology, breeding areas, molting areas, and migration routes, it is difficult to determine the cause or source of a declining population and which sub-populations may be affected. Without understanding the cause of a population decline it becomes extremely difficult to implement conservation and management strategies to reverse its course. Identifying the distribution of a population is the first step in this process.

B. Rationale/Link to Restoration

The location of breeding grounds, migration routes, winter areas, and the timing of migration are all critical factors used to evaluate contaminant uptake or loss in a migratory species as well as evaluating the consequences of other environmental disturbances or changes (Henny et al. 1991). Scoter and goldeneye populations are susceptible to natural and man-made disturbances over a wide and inaccessible geographic area.

To conserve these subsistence resources and restore the traditional activities associated with these two species, we have proposed to identify their movements, distribution, and ecological relationships using satellite telemetry. This information is necessary to identify problems and develop and implement management strategies to promote the species long-term conservation. We hope this information and the activities associated with collecting this data will 1) allow resource managers to reverse population declines; 2) renew local confidence in the health of this food supply; 3) help maintain traditional lifestyles; 4) provide opportunities to the youth of local communities to promote their historical connection with this subsistence resource; 5) merge traditional knowledge with modern science to develop a more complete understanding of scoter and goldeneye life history and ecology; and 6) help students develop skills to promote the long-tern conservation of this species and others important to their economy and lifestyle.

Restoration requires assessment of population health and definition of impediments to recovery. The tasks presented in this proposal will begin the process of understanding the factors that affect population dynamics in surf scoters and develop management strategies to ensure the long-term health and welfare of the population. Without an understanding of the underlying events that influence population change, we can not prescribe specific activities to conserve or enhance the population.

C. Location

In FY 99 capture work will be conducted in Prince William Sound and Lower Cook Inlet. Capture sites will occur in northern PWS between Valdez and Cordova and on northern Montague Island. Exact location of capture sites will depend on the success of the FY98 field season. In FY99 we will attempt to capture birds in different locales than in FY98. Capture sites in PWS will be selected in the same areas used for harlequin ducks (\025 Nearshore Vertebrate Predator Project and \427 Harlequin Duck Recovery Monitoring). Capture sites in Lower Cook Inlet will be located near the communities of Nanwalek and Port Graham. Work at breeding or molting sites will be dictated by information on breeding and molting distribution collected in FY98 and FY99.

In FY99, community involvement (Chugach School District, Youth Area Watch, and traditional knowledge) will be focused in the villages of Tatitlek, Chenega Bay, Nanwalek, and Port Graham. Nanwalek and Port Graham are not within the Chugach School District and are not part of the Youth Area Watch Program.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

This program will continue to incorporate residents of the communities of Prince William Sound and lower Cook Inlet in the collection and monitoring of data. In FY98 project personnel attended workshops in Tatitlek and Port Graham, participated in planning for the youth-elders subsistence conference, and gave a traditional ecological knowledge (TEK) presentation at the EVOS annual workshop. Project personnel will adhere to the protocols for including indigenous knowledge in the restoration process presented in Appendix C of the Invitation to Submit Restoration Proposals for Federal FY 1998. The project will continue to inform and coordinate our community involvement activities, including the collection of indigenous knowledge with Dr. Henry Huntington, TEK specialist Chugach Regional Resources Commission; Hugh Short, Community Coordinator, EVOS Restoration Office; Roger Sampson and Rick DeLorenzo, Chugach School District; and the Subsistence Division of the Alaska Department of Fish and Game.

We will continue to solicit advice from the above parties and gather information on TEK through synthesis workshops, local community facilitators, and residents. We will involve local youth in bird capture and monitoring and TEK data collection through the Youth Area Watch program or local school district program coordinators.

Efforts have and will continue to be made throughout the restoration process to participate in and provide public involvement in the design and implementation of this project. Information gathered from this project will be shared with local communities. Project staff has and will continue to present information to local communities or prepare articles or photographs for Trustee Council publications. Boat and air charter contracts, and other services will be contracted from local sources when possible.

PROJECT DESIGN

A. Objectives

FY 99:

1) Capture 15 surf scoters and 5 Barrow's Goldeneyes in spring on saltwater in PWS and LCI;

2) Mark 10 adult male and 5 adult female scoters and 3 adult male and 2 adult female goldeneyes with surgically implanted satellite telemetry transmitters;

3) Capture and band as many additional seaducks as time and budget allows;

4) Determine migration routes, breeding areas, and molting and wintering sites;

5) Characterize the life history and ecology of breeding and molting areas; collect samples for contaminant studies;

6) Document traditional ecological knowledge about seaducks from residents of PWS and LCI communities (and perhaps communities in the breeding and molting areas, and migration paths); and

7) Incorporate local residents through the Chugach School District and Youth Area Watch program in the collection and monitoring of data, including traditional knowledge.

B. Methods

Capture and Marking

ADF&G will capture, mark, and monitor scoters and goldeneyes with professional staff, veterinarians, and local assistance. We will capture adult birds in late March and early April during the herring spawn, when large flocks of sea ducks aggregate to feed on herring roe. The commercial herring gillnet fishery, which precedes major spawning events by a few days, ranges from April 9-28 for the period from 1972-1993 (Donaldson et al. 1995). Capture sites will be determined by monitoring known areas of herring spawn deposition (Morstad et al. 1996), scoter and goldeneye concentrations, ADF&G Commercial Fisheries Division aerial spawn and survey maps, and local knowledge. Scoters will be captured at a minimum of two sites, one located in northern PWS and one in LCI. Goldeneyes will be captured in northern PWS. We will attempt to capture and implant satellite transmitters in 3 male and 2 female surf scoters at each site.

Surf scoters and Barrow's Goldeneyes will be captured with either floating or land-anchored mist nets suspended among decoys or in passive drive traps consisting of two 100' wings which lead birds into a holding pen in shallow water. Sea kayaks will be used to slowly herd flocks towards a trap. Trap locations will be mapped using Global Positioning Systems and nautical charts (NOAA).

All captured seaducks, in addition to those marked with telemetry, will be banded with USFWS aluminum leg bands. Sex will be identified based on plumage characteristics and age will be determined by bursal probing. Adults do not have a bursa; if possible, second-year birds will be distinguished from third year subadults by bursa depth. Prior to release, birds will be weighed, measured (culmen, tarsus, and wing length) and blood and feather samples will be collected and archived for future contaminant, genetics, and stable isotope studies.

Once transported to the work vessel, a certified veterinarian, trained in avian implant surgeries, will place transmitters in the peritoneal cavity with the antenna exiting caudally, following procedures described by Petersen et al. (1995). Satellite transmitters will measure 10 mm deep, 55 mm long, 35 mm wide and weigh approximately 30 g (<3% body weight) (Telemetry 2000, Columbia, Maryland). Battery life can be expected to last from 6 - 12 months depending on advances in technology at time of purchase. Efforts will be made to maximize battery life. Each transmitter will be hermetically sealed with a Teflon-coated multi-strand stainless-steel antenna. Transmitters will be programmed and calibrated to record and transmit body temperature to confirm that signals are being emitted from live birds. After surgery, birds will be held in an appropriate container and provided water. Ducks will be released when the veterinarian determines they have recovered from the effects of surgery. All ducks will be released at the point of capture.

Satellite transmitters will be programmed to transmit a signal at a time and frequency to ensure they will not interfere with existing telemetry studies. Signals will be analyzed using Service Argos Data Collection and Location System (Landover, Maryland). Argos Standard and Animal-Tracking data processing services will provide near real-time information on the precision of each location through on-line interrogation. Movements will be monitored throughout the life of the transmitter. Locations will be mapped using a Geographic Information System (GIS). Movements and locations of scoters will be forwarded to the Chugach School District and affected communities so students can monitor the progress and movements of birds between breeding, molting, and wintering areas.

Nesting and molting studies.

In early June we will conduct aerial surveys to count surf scoters on lakes and ponds within a five-mile radius of each satellite location. Birds will be counted and classified as breeding pairs, adult males, adult females, and subadults. Lakes and ponds with the highest concentration of breeding pairs will be visited in June and revisited in July and August. Lake perimeters and islands will be searched for nests. Nest site characteristics will be recorded and incubation stage determined. Following hatching, nest success will be calculated and brood density and survival will be estimated. Scoters will be captured with nest traps and mist nets and banded with standard USFWS metal leg bands. Birds will be weighed, measured, and blood and feather samples will be collected. Similar work is not planned for goldeneyes in FY99.

In August, aerial surveys will be conducted at coastal and inland molting sites where we have obtained satellite coordinates. Aerial surveys will be conducted to count both scoters and

goldeneyes. Depending upon the location and logistics, birds will be captured in drive traps, banded, weighed, measured, sexed and aged. Blood and feather samples will be collected.

The Chugach School District, through Youth Area Watch, will provide interested students and teachers to participate in capture and monitoring. The school district will provide classroom aides (computer and software, maps etc.) to be used in local schools for monitoring bird movements throughout the year. ADF&G will relay satellite-monitoring information to local communities. Students will assist in collecting information from local residents on TEK, current sea duck distribution and abundance, and band returns from marked birds shot by local hunters.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

Dan Mulcahy, a licensed veterinarian with USGS-BRD, will assist in satellite telemetry implants. This project and proposed project 99426 Harlequin Duck Population Dynamics, will coordinate and attempt to share resources whenever feasible.

All data collection and analysis will be supervised by ADF&G. Private sector contracts for fuel purchase, equipment, vessel support and air charter will be solicited, usually from the local Prince William Sound or lower Cook Inlet region. Contracts for satellite transmitters and data downloading will be solicited from the private sector.

Cooperation for community involvement will be sought through the EVOS Restoration Office, Chugach School District, the villages of Tatitlek, Port Graham, and Nanwalek, and the Alaska Department of Fish and Game Subsistence Division (see above).

SCHEDULE

A. Measurable Project Tasks for FY 99

November-February: Coordinate and plan community involvement,
Youth Area Watch and TEK.
Attend Synthesis Workshops in local communities.
Meet with local subsistence harvesters.
Attend Restoration Workshop.
Order satellite transmitters and field gear.
Contract for vessel support, veterinary services.
Organize field gear, test equipment.

March-April: Reconnaissance surveys for scoter and goldeneye concentrations.
Capture birds for radio implants.
Maintain and store field equipment.

May-September:	Monitor satellite transmitters. Coordinate community involvement, Youth Area Watch and TEK. Plan field logistics and organize equipment and personnel. Conduct surveys and field work at nesting and molting areas.

B. Project Milestones and Endpoints

FY99

October-March:	Monitor satellite transmitter birds. Coordinate and plan community involvement.
March-April:	Capture birds for transmitter implants.
April:	Submit annual report.
May-September:	Monitor birds for defining migration routes, breeding areas, and molting areas. Coordinate with local communities.
July-August:	Breeding and molting site surveys, habitat assessment, productivity studies.

FY00

October-March:	Monitor satellite transmitter birds. Coordinate and plan community involvement, Youth Area Watch and TEK.
March-April:	Capture birds for transmitter implants.
April:	Submit annual report.
May-September:	Monitor birds for defining migration routes, breeding areas, and molting areas. Coordinate with local communities.
July-August:	Breeding and molting site surveys, habitat assessment, and productivity studies.

C. Completion Date

All project objectives, except final reports and publications, will be met following FY00.

PUBLICATIONS AND REPORTS

An annual report of FY99 activities will be submitted to the Restoration Office before 15 April 2000. Because FY99 is the second year of this proposed three-year project, journal publications will not be generated until completion of all field work and community involvement.

PROFESSIONAL CONFERENCES

March 1999. The non-breeding biology of diving ducks. An International Conference. Parksville, B.C. Dr. R.C. Ydenberg, Dept. of Biological Sciences. Simon Fraser University. Present papers on Project /427 Harlequin Duck Recovery Monitoring and Project\273 (this proposal).

March 1999. Legacy of an Oil Spill: Ten years after *Exxon Valdez.*

NORMAL AGENCY MANAGEMENT

The work proposed here is not part of normal agency management and is related specifically to research addressing oil spill restoration concerns. No similar work has been conducted, is currently being conducted, or is planned using agency funds.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

As described in the Introduction, this research relies on incorporation of methods and data from other EVOS Trustee sponsored research, including projects /427, /025, and proposed project 99426, Harlequin Duck Population Dynamics. Equipment purchased by those projects will be used to conduct this research. Location of research sites, and data collection and analysis will follow previously established standards. All efforts will be made to share vessel support, telemetry monitoring, study sites, and equipment with proposed project 99426.

This project is integrated with project \052B Traditional Ecological Knowledge; project \210 Youth Area Watch; project \025 Nearshore Vertebrate Predator Project; project \320 Predation on Herring Spawn; project \427 Harlequin Duck Recovery Monitoring; project \159 Prince William Sound Marine Bird Surveys; and proposed project 99426-Harlequin Duck Population Dynamics.

See Community Involvement and Traditional Ecological section above for more details on coordination of TEK and Youth Area Watch activities.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

The one change to this project proposal from the FY98 DPD is the addition of Barrow's goldeneyes to the project. Barrow's goldeneyes were added because of their use and importance as a subsistence resource and concern for their populations. The importance of goldeneyes to local communities, and interest in studying them in addition to scoters, was expressed in workshops in Tatitlek and Port Graham.

PROPOSED PRINCIPAL INVESTIGATORS

Dan Rosenberg
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danr@fishgame.state.ak.us

PERSONNEL QUALIFICATIONS

Dan Rosenberg has been a waterfowl biologist for The Alaska Department of Fish and Game (ADF&G) since 1985. From 1980-1983 Mr. Rosenberg conducted field research in Alaska as a waterfowl biologist for the U.S. Fish and Wildlife Service and from 1983-1984 as a Habitat Biologist for ADF&G. Mr. Rosenberg received a Bachelor of Science degree in Wildlife Management from Humboldt State University, Arcata, CA in 1979.

Mr. Rosenberg has conducted harlequin duck population (age and sex structure) and production surveys in Prince William Sound since 1994 as the Principle Investigator of a Trustee sponsored restoration project. He has conducted extensive waterfowl population monitoring and habitat assessment surveys on the Copper River delta, Stikine River delta, Kenai wetlands, upper Cook Inlet, Aleutian Islands, and Kodiak Island. As project leader, Mr. Rosenberg has assessed impacts to waterfowl and wildlife populations from hydroelectric development, urban expansion, habitat alterations, chemical pollutants, timber harvest, and surface mining.

OTHER KEY PERSONNEL

Mike Petrula, Wildlife Biologist, ADFG. Field logistics, capture, data analysis, telemetry monitoring, report preparation.

LITERATURE CITED

Agler, B.A. and S.J. Kendall. 1997. Marine bird and mammal population abundance of Prince William Sound, Alaska: Trends following the TV Exxon Valdez Oil Spill, 1989-96. 1997. Restoration Project 96159. USFWS, Migratory Bird Mgmt. Anchorage.

Babcock, M.M, G.V. Irvine, P.A. Harris, J.A. Cusick, and S.D. Rice. 1996. Persistence of oiling in mussel beds three and four years after the *Exxon Valdez* oil spill. Proceedings of the *Exxon Valdez* Oil Spill, American Fisheries Soc. Symposium 18: 286-297.

Beauchamp, G. 1992. Diving behavior in surf scoters and Barrow's goldeneyes. The Auk 109(4):819-827.

Bellrose, F.C. 1976. Ducks, Geese, and Swans of North America. Wildlife Management Institute. Stackpole Books, Harrisburg, PA.

Bishop, M. A., S.P. Green, and L. Byrne.1995. Avian predation on herring spawn, FY94 ann. rept. Exxon Valdez Oil Spill proj. No. 94320-Q. Copper Riv. Delta Instit. U.S. Forest Serv. Cordova, AK. 17pp.

Bordage, D. and J-P. L.Savard. 1995. Black Scoter (*Melanitta nigra*). *In* The Birds of North America, No.177 (A. Poole and F. Gill, eds.) The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Wash. D.C.

Canadian Wildlife Service, US Fish and Wildlife Service, and US Geological Survey –BRD. 1997. Conservation Issues for North American Sea Ducks, A concept paper for a sea duck joint venture under the North Am. waterfowl manag. plan. 36pp.

Conant, B. and D.J. Groves. 1997. Alaska –Yukon waterfowl breeding population survey. US Fish and Wildlife Service. Juneau. 29pp.

Dau, C.P. 1987. Birds in nearshore waters of the Yukon-Kuskokwim Delta, Alaska. The Murrelet 68(1):12-23.

Donaldson, W., S. Morstad, D. Sharp, J. Wilcox, and S. Sharr. 1995. Prince William Sound Management Area 1993 Annual finfish management report. Regional Information Rept. No. 2A95-20. ADF&G. Commercial Fisheries Management and Development Division, Anchorage. 150 pp.

Exxon Valdez Oil Spill Trustee Council. 1996. *Exxon Valdez* Oil Spill Restoration Plan. Draft Update on Injured Resources & Services Anchorage.

Gabrielson I.N.and F.C. Lincoln, 1959. Birds of Alaska. Stackpole Books, Harrisburg, PA, and the Wildl. Manage. Institute, Wash. D.C.

Goudie, R.I., S. Breault, 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. Trans. 59th N. Am. Wildl. Nat. Resour. Conf.:27-49.

Godfrey, W.E. 1986. The Birds of Canada. National Mus. of Nat'l Sciences. Ottawa. 595pp.

Henny, C.J., L.J. Blus, R.A. Grove, and S.P. Thompson. 1991. Accumulation of trace elements and organochlorines by surf scoters wintering in the Pacific Northwest. Northwest Naturalist. 72:43-60.

_____, D.B. Rudis, T.J. Roffe, and E. Robinson-Wilson. 1995. Environ. Health Perspec. 103(Suppl 4):41-49.

Herter, D.R., S.M. Johnston, and A.P. Woodman. 1989. Molt migration of scoters at Cape Pierce, Alaska. Arctic. vol.42, no.3. pp 248-252.

Hodges, J.I., King J.G., Conant, B., Hanson, H.A. 1996. Aerial surveys of waterbirds in Alaska 1957-94: Population trends and observer variability. Information and Technology Report 4. USDI, Nat'l Biological Service U.S. Fish and Wildlife Service.

Isleib, M.E. and B. Kessel. 1973. Birds of the North Gulf Coast-Prince William Sound, Alaska. Biol. Pap. Univ. Alaska No. 14. 149 pp.

Johnsgard, P.A. 1975. Waterfowl of North America. Indiana Univ. Press. Bloomington. p.464.

Johnson, S.R. and W. J. Richardson. 1982. Waterbird migration near the Yukon and Alaskan coast of the Beaufort Sea: II. Moult migration of seaducks in summer. Arctic vol.35, no.2. pp 291-301.

Koehl, P.S., T. R. Rothe, and D.V. Deksen. 1984. Winter food habits of Barrow's goldeneyes in southeast, Alaska. In Nettleship, D.N., G.A. Sanger, and P.F. Springer (eds.), Marine Birds: Their feeding ecology and commercial fisheries relationships, Canadian Wildl. Serv. Spec. Pub., Ottawa, Ontario, pp. 1-5.

Lebreton, J. D., K. P. Burnham, J. Clobert, and D. R. Anderson. 1992. Modeling survival and testing hypotheses using marked animals: case studies and recent advances. Ecol. Monogr. 62:67-118.

Morstad, S., D. Sharp, J. Wilcox, and J. Johnson. 1996. Prince William Sound Management Area 1995 Annual finfish management report. Regional Information Rept. No. 2A96-25. ADF&G. Commercial Fisheries Management and Development Division, Anchorage. 135 pp.

Morstad, S., D. Sharp, J. Wilcox, and J. Johnson. 1997. Prince William Sound Management Area 1996 Annual finfish management report. Regional Information Rept. No. 2A97-17. ADF&G. Commercial Fisheries Management and Development Division, Anchorage. 144 pp.

Ohlendorf, H.M., K.C. Marois, R.W. Lowe, T.E. Harvey, and P.R. Kelly. Trace elements and organochlorines in surf scoters from San Francisco Bay, 1985. Environ. Monit. Assess 18:105-122.

Petersen, M. R., D. C. Douglas, and D. M. Mulcahy. 1995. Use of implanted satellite transmitters to locate spectacled eiders at-sea. Condor 97:276-278.

Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990. Immediate impact of the *Exxon Valdez* oil on marine birds. The Auk 107: 387-397.

Salomonsen, F. 1968. The moult migration. Wildfowl 19:5-24.

Savard, J-P L. and P. Lamothe. 1991. Distribution, abundance, and aspects of breeding ecology of black scoters, *Melanitta nigra,* and surf scoters *M. perspicillata,* in northern Quebec. Can. Field Nat. 105(4):488-496.

Scott, C.L., A.W. Paige, G. Jennings, and L. Brown. 1996. Community Profile Database Catalog, Vol 2. Alaska Department of Fish and Game Div. of Subsistence. Juneau.

Short, J.W. and M.M. Babcock. 1996. Prespill and postspill concentrations of hydrocarbons in mussels and sediments in Prince William Sound. Proceedings of the *Exxon Valdez* Oil Spill, American Fisheries Soc. Symposium 18: 149-166.

Vermeer, K. 1981. Food and populations of surf scoters in British Columbia. Wildlfowl 32: 107-116.

_____, 1982. Food and distribution of three *Bucephala* species in British Columbia waters. Wildfowl 33:22-30.

_____, and D.B. Peakall. 1979. Trace metals in seaducks of the Fraser River Delta intertidal area, British Columbia. Marine Pollution Bulletin. Vol. 10. pp189-193.

Zwiefelhofer, D. and D.J. Forsell. 1995. Population trends of seaducks wintering in Kodiak Alaska – A sixteen year study. Abstract. Joint conference of the Colonial Waterbird Society and the Pacific Seabird Group. Victoria, B.C.

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Budget Category:	Authorized FY 1998	Proposed FY 1999
Personnel	$66.4	$88.1
Travel	$7.6	$12.9
Contractual	$42.3	$55.7
Commodities	$38.4	$63.8
Equipment	$2.8	$0.0
Subtotal	$157.5	$220.5
General Administration	$12.9	$17.1
Project Total	$170.4	$237.6
Full-time Equivalents (FTE)	1.1	1.4
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FY 2000	Estimated FY 2001	Estimated FY 2002		
$240.0				

Dollar amounts are shown in thousands of dollars.

Comments:
Contractual costs for warehousing equipment may be reduced by up to $9,600 depending upon ADF&G obtaining on-site warehouse space.
The greatest expense for this project is the cost of satellite transmitters and related data downloading expenses from Service Argos Inc., a satellite based location and data collection system. Both are sole source at this time.

No money is allocated for NEPA compliance. Only salary money is allocated for attendance at Anchorage workshops. Travel to villages for TEK "Synthesis Workshops" is included. Travel for students to participate in field work as part of Youth Area Watch and school district programs is not included in this budget.

FY 99

Prepared: 4/9/98
Revised: 4/10/98, JRS

Project Number: 99273
Project Title: Scoter and Goldeneye Life History and Ecology: Linking Satellite Technology with Traditional Knowledge to Conserve the Resource.
Agency: ADFG

FORM 3A
TRUSTEE
AGENCY
SUMMARY

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 1999
D. Rosenberg	WBIII, Principle Investigator	18J	7.0	6.5		45.5
Mike Petrula	WBI, Data analysis, report prep., graphics	14C	7.0	4.2	2.0	31.4
1 F&G Tech.	F&G Tech. IV, Field Technician	13D	1.5	4.0	1.0	7.0
1 F&G Tech.	F&G Tech. III, Field Technician	11F	1.0	3.7	0.5	4.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		16.5	18.4	3.5	
					Personnel Total	$88.1

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 1999
Portage-Whittier Alaska Railroad vehicle,boat, and 1 psng.	0.4	2			0.8
Portage-Whittier Alaska Railroad vehicle and psng.	0.2	4			0.8
Portage-Whittier Alaska Railroad Psg. fare	0.1	1			0.1
Anchorage-Tatitlek by air	0.3	3	3	0.1	1.2
Anchorage -Valdez by air	0.2	2	4	0.1	0.8
Anchorage-Chenega by air	0.2	2	2	0.1	0.6
Anchorage -Port Graham by air	0.3	3	4	0.1	1.3
Airport parking, taxi fare, excess baggage	0.2				0.2
Per diem, Homer, Whittier			10	0.1	1.0
Travel to sea duck symposium, Parksville, B.C.	0.8	1	5	0.1	1.3
Travel to molt and nest sites, commercial airlines to charter location	0.5	8	8	0.1	4.8
				Travel Total	$12.9

FY 99

Prepared: 4/9/98
Revised: 4/10/98, JRS

Project Number: 99273
Project Title: Scoter and Goldeneye Life History and Ecology: Linking Satellite Technology with Traditional Knowledge to Conserve the Resource.
Agency: ADFG

FORM 3B
Personnel & Travel
DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

Contractual Costs:		Proposed FY 1999
Description		
Warehouse for equipment storage and maintenance - 12 months @ $800/mo		9.6
Air charter for field support 15 hrs @ $250/hr		3.8
Boat and outboard motor repair		1.5
Trailer and boat moorage Whittier		0.1
Photo processing		0.2
Vessel support for bird capture and marking 12 days @1400/day		16.0
Satellite telemetry data downloading		19.0
Air freight - equipment shipment		0.5
Veterinarian	Surgical Implants	3.0
Anesthetist	Administer anesthetics	2.0
When a non-trustee organization is used, the form 4A is required.	**Contractual Total**	$55.7

Commodities Costs:	Proposed FY 1999
Description	
Boat fuel 175 galllons @ $1.50/gal	0.3
Boat supplies- replacement parts, props, fuel lines, fuel filters, water filters, battery, absorbent rags, oil, emergency provisions	0.8
Field survey supplies- rite-in-rain notebooks/paper, nautical charts, batteries,	0.3
Computer software for analysis, graphing, mapping, web page development	0.8
Camp materials and supplies	0.7
Camp Food, 4 people x10 days @ $18/day/person	1.8
Mist nets and trapping equipment	1.6
Satellite radio transmitters - 20 @ $2,800 each	56.0
Veterinarian surgical supplies	1.5
Commodities Total	$63.8

FY 99

Prepared: 4/9/98
Revised: 4/10/98, JRS

Project Number: 99273
Project Title: Scoter and Goldeneye Life History and Ecology: Linking Satellite Technology with Traditional Knowledge to Conserve the Resource.
Agency: ADFG

FORM 3B
Contractual & Commodities DETAIL

FY 99 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1998 - September 30, 1999

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1999
NONE			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
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
20 ft. Caribe rigid hull inflatable	1	
17 ft. Boston Whaler	1	
10x40 binoculars	4	
Spotting Scopes	2	
Achilles 8 ft inflatable dinghy	2	
Remington Shotguns	2	
Honda generators	3	
Survival Suits	2	
Outboard Motors/various hp	6	
Magellan GPS	3	
Marine VHF radios	4	

FY 99

Prepared: 4/9/98
Revised: 4/10/98, JRS

Project Number: 99273
Project Title: Scoter and Goldeneye Life History and Ecology: Linking Satellite Technology with Traditional Knowledge to Conserve the Resource.
Agency: ADFG

FORM 3B
Equipment
DETAIL