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FY 2001 Final Workplan:

Approved Detailed Project Descriptions and Budgets

Exxon Valdez Oil Spill Trustee Council

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MEMORANDUM

TO: Restoration Work Force

FROM: Sandra Schubert SSchubert

RE: Binders of FY 01 DPDs and Budgets

DATE: August 21, 2000

The attached binders contain DPDs and detailed budgets for the FY 01 projects approved by the Trustee Council on August 3, 2000. Deferred projects will be taken up by the Council at a December meeting (no date yet). DPDs and budgets for any projects approved at that time will be provided as addenda to these binders. Each binder contains an index of projects approved in August. The following projects have been deferred:

Proj. #	Project Title
01064	Harbor seal monitoring
01163	APEX
01339	Manuscript: human use model
01393	Food webs
01396	Shark assessment
01404	Archival tags
01407	Harlequin population dynamics
01441	Harbor seal diet (part)
01452	Hydroacoustics: pinks & plankton
01482	PSP monitoring
01486	Mussel beds and predators
01532	Retrospective analysis: nearshore commun.
01543	Assessment of oil in intertidal (part)
01586	Climate change/forage fish:stable isotopes
01602	Herring synthesis follow-up
01630	GEM planning (part)

FY 01 WORK PLAN: Index of DPDs and Budgets Approved 8/3/00

Proj.No.	Project Title
01012-BAA	Photographic and Acoustic Monitoring of Killer Whales in Prince William Sound and Kenai Fjords
01052	Community Involvement Planning for GEM
01100	Public Information, Science Management, and Administration
01126	Habitat Protection and Acquisition Support
01131	Chugach Native Region Clam Restoration
01144	Common Murre Population Monitoring
01154	Archaeological Repository, Display Facilities, and Exhibits for Prince William Sound and Lower Cook Inlet
01159	Surveys to Monitor Marine Bird Abundance in Prince William Sound During Winter and Summer
01190	Construction of a Linkage Map for the Pink Salmon Genome
01195	Pristane Monitoring in Mussels
01210	Youth Area Watch
01245	Community-Based Harbor Seal Management and Biological Sampling
01247	Kametolook River Coho Salmon Subsistence Project
01250	Project Management
01256B	Sockeye Salmon Stocking at Solf Lake
01273-CLO	Scoter Life History and Ecology: Linking Satellite Technology with Traditional Knowledge to Conserve the Resource
01290	Hydrocarbon Database and Interpretation Service
01327-CLO	Pigeon Guillemot Restoration Research at the Alaska SeaLife Center
01338	Survival of Adult Murres and Kittiwakes in Relation to Forage Fish Abundance
01340	Toward Long-Term Oceanographic Monitoring of the Gulf of Alaska Ecosystem
01341-CLO	Harbor Seal Recovery: Controlled Studies of Health and Diet
01360-BAA	The *Exxon Valdez* Oil Spill: Guidance for Future Research Activities
01366-CLO	Improved Salmon Escapement Enumeration Using Remote Video and Time-Lapse Recording Technology
01371-CLO	Effects of Harbor Seal Metabolism on Stable Isotope Ratio Tracers
01385	Partnering with NOAA to Quantify and Monitor Environmental Attributes of Kachemak Bay
01389	3-D Ocean State Simulations for Ecosystem Applications from 1995-98 in Prince William Sound
01391	Cook Inlet Information Management/Monitoring System (CIIMMS)
01401	Assessment of Spot Shrimp Abundance in Prince William Sound

FY 01 WORK PLAN: Index of DPDs and Budgets Approved 8/3/00

Proj.No.	Project Title
01423	Patterns and Processes of Population Change in Selected Nearshore Vertebrate Predators
01424	Restoration Reserve
01441-CLO	Harbor Seal Recovery: Effects of Diet on Lipid Metabolism and Health
01454-CLO	Evidence and Consequences of Persistent Oil Contamination in Pink Salmon Natal Habitats
01462-CLO	Effect of Disease on Pacific Herring Population Recovery in Prince William Sound
01476	Effects of Oiled Incubation Substrate on Pink Salmon Reproduction
01478	Testing Satellite Tags as a Tool for Identifying Critical Habitat
01479	Effects of Food Stress on Survival and Reproductive Performance of Seabirds
01481	Documentary Film on the Oil Spill Impacts on Subsistence Use of Intertidal Resources
01492	Were Pink Salmon Embryo Studies in Prince William Sound Biased?
01513	*Exxon Valdez* Oil Spill Exhibit: The Continuing Legacy
01534	Comparison of Cytochrome P4501A Induction in Blood and Liver Cells of Sea Otters
01535	EVOS Trustee Council Restoration Program Final Report
01543	Evaluation of Oil Remaining in the Intertidal from the *Exxon Valdez* Oil Spill
01550	Alaska Resources Library and Information Services
01551-BAA	Checklist and Distributional Analysis of Marine Algal Species Collected as Vouchers Under Project CH1A
01552-BAA	Exchange Between Prince William Sound and the Gulf of Alaska
01555	Can Stress Hormones be Used as an Indication of Food Availability and Reproductive Performance? An Experimental Approach
01558	Harbor Seal Recovery: Application of New Technologies for Monitoring Health
01599-CLO	Evaluation of Yakataga Oil Seeps as Regional Background Hydrocarbon Sources in Benthic Sediments of the Spill Area
01610	Kodiak Archipelago Youth Area Watch
01630	Planning for Long-Term Research and Monitoring Program

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01012

Photographic and Acoustic Monitoring of Killer Whales in Prince William Sound and Kenai Fjords

Project Number:	01012-BAA
Restoration Category:	Monitoring
Proposer:	C. Matkin/North Gulf Oceanic Society
Lead Trustee Agency:	NOAA
Cooperating Agencies:	None
Alaska SeaLife Center:	No
New or Continued:	Cont'd
Duration:	9th yr.
Cost FY 01:	$74.5
Cost FY 02:	
Geographic Area:	Prince William Sound, Kenai Fjords
Injured Resource/Service:	Killer whale

ABSTRACT

This project will continue the monitoring of the damaged AB resident pod and the potentially endangered AT1 transient population as well other Prince William Sound/Kenai Fjords killer whales. Monitoring has occurred on a yearly basis since 1984. Methods include the photo-identification of individual whales and acoustic monitoring with remote and vessel-based hydrophone systems. The project continues interpretation of current and previous data as well as data collected with other funds. [NOTE: This project also requested funds for FY 01 ($72,000), FY 03 ($75,000), and FY 04 ($80,000).]

INTRODUCTION

This project is a continuation of the reduced annual killer whale monitoring program. Killer whales were monitored under EVOS Trustee Council funding in 1989, 1990, and 1991 (damage assessment) and in 1993 and 1995 (restoration monitoring). A reduced annual monitoring program was initiated in 1996. Analysis in this project will build on results of the comprehensive killer whale investigation initiated in FY95 and continued in FY96, FY97, and FY98. In FY99 and FY00 the monitoring program was augmented with matching funding to continue aspects of genetic and contaminant analysis and we expect this to be the case in 2001.

On March 31, 1989 AB pod was observed in oil sheens and six of the 36 pod members were missing. A total of 14 whales were lost from resident AB pod in the two years following the *Exxon Valdez* oil spill and there was no recruitment into the pod during those years. Since that time the social structure within AB pod has shown signs of deterioration. Maternal groups have traveled independently or with other pods, and pod members have not consistently traveled with closest relatives. Although 4 calves were recruited during the period 1992-1994, there were 5 additional mortalities in 1994. There has been a net increase of only two individuals since 1995. Due to two additional mortalities in 1999 and one recruited calf, the pod currently contains 24 individuals. The rate of mortality observed in this pod after the oil spill far exceeds that recorded for other resident pods observed in Prince William Sound over the past 13 years or for 19 pods in British Columbia over the past 20 years. Continued mortalities have prevented recovery.

Nine whales from the transient AT1 group have not been observed since 1989. Two additional AT1 whales have not been sighted for seven years. From genetic and photographic data from beached whales, two of these eleven whales are known to be dead. Although transient killer whale social structure is not fully understood, we are increasingly certain that the missing AT1 whales are dead. Statistical analysis also strongly suggests that they have either died or permanently emigrated from the area. Since there is no record of them in adjacent regions and they appear to have a limited range, it is most likely they are dead.

This project will continue the monitoring program necessary to map the changes (recovery or non-recovery) of Prince William Sound killer whales on a reduced annual basis. Behavioral observations and spatial and temporal data will be collected opportunistically in the course of photographic and acoustic monitoring, but there will be no new analysis of this data.

Fourteen years of systematic data collected under public and private funding have been placed in a specially designed GIS database currently housed at the U.S. Fish and Wildlife Service, Marine Mammals Management Division, Anchorage, Alaska. The database contains 763 records of encounters with killer whales in and near Prince William Sound and Kenai Fjords, Alaska. Among these are 557 encounters with resident whales and 206 encounters with transient-type whales. Analyses have found large-scale differences in spatial distribution patterns between resident and transient whales over time (Sheel et al in press). Changes in transient whale distributions have been examined in relation to changes harbor seal populations.

There is worldwide concern that specific PCB and dioxin congeners may have negative effects on reproduction in mammals. The recovery of killer whales in Prince William Sound and the long-term health of the population is dependent on unimpeded reproductive processes. Recently there is concern over contaminant levels and their relationship to the recent decline of southern resident killer whales in Puget Sound. During this study we have determined contaminant levels in both resident and transient killer whales, and found much higher levels in the transient population. Contaminants seem to passed from mother to offspring via lactation and levels follow consistent patterns within genealogies. Samples were obtained from individually identified living whales that can be

resampled to assess future changes in levels. The ability to sample and potentially resample specific known individuals and their known kin is a unique aspect of this project. Soon to be published results (Ylitalo et al, in prep.) raise concern that contaminants in transient whales could negatively impact reproduction. There has been no successful reproduction in the AT1 group since 1984. All chemical analysis of tissue and assistance in the interpretation of results has been provided without cost by the NMFS/NOAA Environmental Contaminant Laboratory, Seattle, Washington.

In FY97 we initiated a remote hydrophone and acoustic analysis monitoring element. Initial analysis and separation of pods has been completed and initial publication readied for submission. Currently we are operating a single hydrophone in Resurrection Bay powered by solar and wind power and using microwave transmission technology. It is currently operational and is effectively documenting presence and absence of killer whales during the winter months

We are still compiling our catalogue of acoustic dialects for resident pods. In 1999 we obtained much needed recordings of AJ, AD05 and AD16 pods. We are hopeful of obtaining additional recordings of AG, and AF pods to fill out pod specific repertoire data. (NGOS is using a 16 year database of killer whale recordings to establish killer whale dialects). The dialect of the AT1 transient group have been established and also related to behavior. (Saulitis et al, in prep) The dialect catalogue is used to document the presence of specific killer whale pods and groups recorded from the remote hydrophone. The long-term goal of this aspect of the project is to determine the extent of winter use by killer whales of these inshore waters and provide an additional, innovative, cost effective tool for monitoring killer whales year round. A hydrophone in Resurrection Bay has the added benefit of providing a continuos live feed to the Alaska Sea Life Center and Seward for the education of visitors and residents. In winter 1998/99, using in kind donations for opportunistic surveys, we were able to determine that AB pod used inner Resurrection Bay on a routine basis in all months from October to April. Other pods including AI, AN10, and AJ were also present at times. In winter 1999-2000 acoustic monitoring indicated whales were absent for most of the late fall/midwinter, however, AJ pod and AD05 pods returned in late winter.

NEED FOR THE PROJECT

A. Statement of Problem

The AB pod of killer whales was injured by the EVOS. Although it had shown signs of recovery from 1991 to 1993, mortalities in 1994/95 reduced the number of surviving AB pod whales to 22. Since 1995 there has been a net gain of only two individuals, and recovery has not occurred. At least 11 of the AT1 group of transient killer whales have apparently died since 1989 and there has been no recruitment within the group. This project will continue to monitor the status of AB pod and the AT1 group.

Sightability of killer whales in Prince William Sound has changed since the spill; particularly resident whales are now more frequently encountered in the Kenai Fjords region. Transient whales are seen less frequently in all areas.

Initial mortalities within AB pod following the spill have apparently led to additional mortalities due to loss of key individuals. Deterioration of AB pod social structure has led to a situation where one subpod now travels separately most of the time (the AB25 supod travels with AJ pod). The project will provide long-term insight into effects of changes in killer whale social structure due to unnatural mortalities.

Despite considerable effort, re-sightings of the AT1 group have declined and fewer individuals are seen when members of this transient group are located. We are confident that half of the original 22 members of this group are dead, or have emigrated to other

regions; although the later possibility is very unlikely. None of these whales have been identified in southeastern Alaska despite healthy pinneped populations in that region.

Although the rate of encounter with members of the AT1 transient group has declined, there has been no detectable increase in the sightings of other transient groups, suggesting that other transients are not increasing their use of the Sound as use of the region as AT1 group declines. Whether this overall decline in the encounters with transient (marine mammal eating) killer whales is related to oil spill effects or ecosystem changes is not clear, but we suspect a combination of the two factors. It is likely that the severe decline in harbor seals and Steller sea lions are important factors in the decline of transients in the region.

MtDNA and nuclear DNA analysis has demonstrated the genetic uniqueness of the AT1 group from residents as well as from other transients. Our nuclear DNA analysis is confirming those differences. The loss of the AT1 group could represent a serious overall loss of genetic diversity.

Some environmental contaminants such as PCBs and DDTs have been linked to reproductive dysfunction in mammals. We have discovered high levels of these contaminants in the transient (marine mammal eating) killer whales, including the non-reproducing AT1 group. When compared to other cetacean populations, these levels appear to be in a range that could result in reproductive dysfunction or other effects that might impede recovery of this group.

B. Rationale/Link to Restoration

Annual killer whale population monitoring will determine recovery status of AB pod and the AT1 transient group. The actual status of AB pod is considered non-recovering at this time. Long term patterns will only be clarified by continued monitoring. A low level annual monitoring program was initiated in FY96 and is proposed to continue in FY01. Since all pods and whales are not observed in every year, annual monitoring will prevent extensive data gaps and allow determination of recruitment and mortalities in a much shorter time frame. An annual killer whale behavioral database of spanning 16 years now exists in a GIS format. It is accompanied by a photographic database the includes identifications of all individuals from each frame of film for every encounter logged in the GIS system. This data system will be used to log all encounters and summarize effort. Because killer whales are a long-lived species with low reproductive and mortality rates, this monitoring must be consistent and long-term to be meaningful. Without the pre-spill monitoring of these whales damage assessment would have been impossible. This species is a key ecosystem element (a sentinel species) reflecting long-term environmental trends and is worthy of inclusion in a long-term monitoring program.

Continued development of acoustic monitoring and dialect is providing a cost-effective year- round extension of the monitoring program. We will continue to work cooperatively with the Alaska Sea Life Center, Kenai Fjords National Park, and See More Wildlife Systems in this endeavor. In addition we will be providing a two day workshop in May 2000 for tour and charter boat operators in the region to draft guidelines for behavior of their vessels in the presence of whales. Over 100,000 visitors used these operators to view wildlife in 1999 Our program will directly involve residents and visitors in the process of monitoring and restoration through connection with Alaska Sea Life Center and Kenai Fjords charter boat industry.

C. Location

This project is part of an ongoing killer whale research in Prince William Sound and the Kenai Fjords region, Alaska. The project involves the village of Chenega, Port San Juan Hatchery, the Alaska Sea Life Center, Kenai Fjords National Park, and other

residents and visitors to the region. It operates cooperatively with the Kenai Fjords and Prince William Sound tourboat industry.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

There is great public concern and interest for killer whales in Prince William Sound and in Kenai Fjords. The rapidly expanding tourboat industry depends on a healthy killer whale population to attract and satisfy visitors and residents. We have been closely involved with tourboat and recreational operators and residents by exchanging sighting information on a daily basis and providing a catalogue of individual whales to enhance enjoyment of whale observation. We have provided and continue to provide workshops detailing whale biology. We will conduct an intensive 2 day whale watching guideline workshop with tourboat operators and conduct onboard training for operations around marine mammals. We are involved in the Youth Area Watch program, taking young students out to participate in our research. Recent publication of an updated identification catalogue that includes details of our research results and viewing guidelines has further sparked interest in these whales. Killer whales now draw thousands of visitors to the region each year.

We continue to collect observations and stories from native residents and others that will provide background for interpretation of our findings and place the work in a historical and cultural perspective. Some of these legends and stories are used to place our research in a broader context in our recent publication: "Killer Whales of Southern Alaska".

PROJECT DESIGN

A. Objectives

1. Continue photographic monitoring program and determine status of resident killer whale pods, particularly AB pod. Examine the demographics of this pod in relation to other resident killer whale pods.

2. Monitor the AT1 group of transient killer whales to determine mortality or recruitment and indications of recovery to pre-spill distribution and abundance.

3. Monitor year round movements of resident and transient killer whales using remote hydrophone in Resurrection Bay.

4. Continued analysis of calls and separation of pod dialects necessary for interpretation of remote hydrophone data.

B. Methods

Killer Whale Photographic Monitoring

The goal of this aspect of the study is the photoidentification of each individual in each pod/group, that regularly uses the Sound, particularly AB pod and the AT1 group. Knowledge of the demographics of all regularly sighted pods and groups may be necessary to meet recovery definitions.

Thus, it is important that researchers maximize the time actually spent with killer whales (particularly AB pod and the AT1 group) to insure thorough identification of all individuals. Methods proposed to obtain photographic data necessary to meet monitoring objectives will be similar to those used by the NGOS in Prince William Sound/Kenai Fjords for the past sixteen consecutive years. Searches for whales will not be made on random transects, but based on current and historical sighting information. In addition whales will be located by listening for killer whale calls with a directional hydrophone (calls can be heard up to 10 miles away), or by responding to VHF radio calls from other vessels reporting sightings of whales. We have developed network of cooperating vessel owners and tourboat operators that regularly report whale sightings. In addition, requests for recent killer whale sightings will be made routinely on hailing Channel 16 VHF and working channel 77.

A vessel log and chart of the vessel track will kept for each day the research vessels operate. The elapsed time and distance traveled will be recorded and vessel track plotted. Record will be made of the time and location of all whale sightings and the weather and sea state noted at regular intervals.

Specifics of each encounter with killer whales will be recorded. The killer whale encounter data sheet developed in 1995 and specifically tailored to GIS data entry requirements will be used. Data recorded will include date, time, duration, and location of the encounter. Rolls of film exposed and the estimated number of whales photographed will also be recorded. A chart of the whales' trackline during the encounter will be completed and the distance traveled by the vessel with the whales will be calculated at the time of GIS input. General behavior of the whales (i.e. feeding, resting, traveling, socializing, milling) will be recorded by time and location.

Photographs for individual identification will be taken of the port side of each whale showing details of the dorsal fin and gray saddle patch. Photographs will be taken at no less than 1/1000 sec using Fuji Neopan 1600, a high speed black and white film,. A Nikon 8008 or N70 autofocus camera with internal motor drive and a 300 mm f4.5 autofocus lens will be used. When whales are encountered, researchers will systematically move from one subgroup (or individual) to the next keeping track of the whales photographed. If possible, individual whales will be photographed several times during each encounter to insure an adequate identification photograph. Whales will be followed until all whales are photographed or until weather and/or darkness makes photography impractical.

All photographic negatives will be examined under a Wild M5 stereomicroscope at 9.6 power. Identifiable individuals in each frame will be recorded. When identifications are not certain, they will not be included in the analysis. Unusual wounds or other injuries will be noted. Photographic negatives will be analyzed using a photographic database that spans sixteen years. Identities of each whale that appears in every frame of usable film will be recorded and stored in VAX computer system. Final analysis and assessment will follow Matkin et al. (1994).

The primary vessel used to secure identification photographs will be a 34' diesel inboard powered vessel capable of 20 knots, that can sleep 3-4 individuals (R.V. *Windwalker).* With sleeping accommodations and large fuel capacity, the R.V. *Windwalker* can remain in the field for extended periods photographing whales.. This vessel will operate a total of 50 days under funding from this project, with periods of operation in May as well as during the late July through early September period. From historical data these dates are judged to be to be the most likely time to encounter AB pod as well as many of the other resident pods that use the Prince William Sound and Kenai Fjords.

The report for the monitoring segment will include a summary of field effort, and summary of the pods and individuals encountered and a status report on AB pod and the AT1 group. Changes within AB pod will be examined with consideration for the age and sex structure of the pod and maternal groups within the pod. Frame by frame input of

identification data from exposed film into VAX and IBM PC computer systems will occur and identifications tabulated by pod and by individual. Copies of killer whale encounter data and vessel logs will be made available to the EVOS Trustee Council and/or lead agency and this data will be archived in the GIS database for potential future analysis. Frame by frame identification data will also be made available on disc. Copies of the GIS program and data base will also be made available by request to NGOS.

Acoustic Monitoring

Pod specific dialects for resident killer whales have been determined from tape recordings made by several researchers in the Prince William Sound area and in Southeast Alaska during the spring and summer months of the years 1984 to 1997. Construction of a catalogue of pod specific dialects is ongoing and dependent on recordings that will be made during the FY99 field season. Specific calls from Prince William Sound transient (AT1 group) killer whales also have been catalogued (Saulitis 1993, Saulitis in prep.). A total of 8456 calls have been screened and digitized using a Kay Elemetrics Real Time Sound Spectrum Analyzer, Model 5500. Samples from this screening process were digitized using the Canary acoustic spectrum analysis software (The Cornell Bioacoustics Workstation). Calls from different killer whale pods and transient groups are being categorized using the same method used by John Ford in British Columbia, Canada. This process involves arbitrary acoustical identification paired with a visual and statistical comparison of sound spectra. The results of this initial analysis were presented at the 12th Biennial Conference of Marine Mammalogy in Monaco (Yurk , H., Barrett-Lennard, L., Ford, J.K.B., Matkin, C.M., Saulitis, E., and K. Heise. 1998. Clans among resident killer whales (*Orcinus orca*) in Prince William Sound.)

Continued assessment of repertoires of Prince William Sound killer whales will occur in 2000. A publication detailing the linkage of dialect and genetic data Hopefully this will include the repertoires of the less frequently encountered pods from which we will attempt to obtain recordings from in FY99. In addition, recordings from the remote hydrophone obtained will be analyzed. The acoustic relationships between resident pods will be clarified and further compared with genetic results. While similarities of mitochondrial DNA sequences or overall genetic similarity describes relatedness of pods within the past 10,000 to 20,000 years, dialects reflect the more recent history of community divergence.

Because of movements of killer whales into the Kenai Fjords region during the early and late winter months in recent years, our remote hydrophone has operated in the Thumb Point area of Resurrection Bay . An anchored and encased cable runs from the transmitter on shore to the hydrophone at a depth of about 30 meters. A microwave transmission system will relays acoustic signals to Seward. The system is operated by a combination of wind and solar power coupled with storage batteries.

During summer months the hydrophone will be monitored from the R.V *Windwalker* as an aid in locating whales. During the summer and winter months in Kenai Fjords it will be monitored in Seward on a regular basis. Receivers are equipped with recording systems. The receiver will be monitored on a regular scheduled basis and a log of operation maintained. Whale calls will be recorded by M. Brittain in Seward and analyzed by Harald Yurk at the University of British Columbia.

Most equipment needed to complete the contracted field research will be provided by the North Gulf Oceanic Society, including binoculars, nets, directional hydrophones, photographic equipment and biopsy equipment. Remote hydrophone equipment and maintenance of that equipment will be provided by contract to See More Wildlife Systems. Apple Macintosh and IBM compatible computers owned by NGOS as well and the GIS system at U.F.W.S, Marine Mammal Management Division in Anchorage and VAX data

system at the Pacific Biological Station, Nanaimo will be used for data storage and analysis.

C. Contracts and Other Agency Assistance

The entire project will be completed under the auspices of the North Gulf Oceanic Society(NGOS) under permits held by NGOS. NGOS will provide a technician to enter data collected in 2001 into the GIS database housed at U.S.F.W.S. in Anchorage using the a preexisting menu interface. Final photographic analysis will be completed by Graeme Ellis at the Pacific Biological Station in Nanaimo, B.C. Acoustic analysis will be conducted by Harold Yurk at the University of British Columbia. Monitoring the remote hydrophone system will be a cooperative project with Mike Brittian and the Alaska Sea Life Center. Contracts for vessel leases will be issued by the North Gulf Oceanic Society or the Society will use its own vessel for the project.

SCHEDULE

A. Measurable Project Tasks for FY2001

Oct 1-30 2000: Summarize monitoring fieldwork for FY2000. Input data into GIS system.

Oct. 1 - Dec. 31, 2000: Analysis of photographs from 2000 fieldwork.

Oct. 1-Dec. 31, 2000: Acoustic analysis of killer whale calls from previous year.

Oct. 1, 2000- May 1 2001: Publication of paper on population dynamics of killer whale pods since EVOS.

Oct. 1 2000- March 30 2001: Continue winter recordings in Seward from remote hydrophone.

May -Sept. 2001: Killer whale monitoring emphasis field work. Monitor hydrophone from research vessel as possible.

The R.V.*Windwalker* will operate for 50+ selected days in May, July, August and September. The primary function of this vessel will be killer whale photoidentification monitoring. Time periods is selected are based on historical periods of high encounter rate with AB pod, other resident pods and the AT1 transient group and sighting reports from tourboat operators. Operational expense for additional field days will be funded by other monies.

B. Project Milestones and Endpoints

The FY2001 killer whale project will continue the reduced annual photoidentification monitoring program and the acoustic monitoring program initiated in FY1997. Future fieldwork will involve population monitoring and acoustic monitoring and regular publications of results.

C. Completion Date

Killer whale monitoring and remote hydrophone projects are completed on an annual basis, however they are envisioned as ongoing elements of the GEM program.

PUBLICATIONS AND REPORTS

Matkin, C.O., G.E. Ellis, and E. Saulitis. Populations of killer whales in Prince William Sound eleven years after the *Exxon Valdez* oil spill. To be submitted to Marine Mammal Science.

Saulitis, E.S., F. Fay, and C.O. Matkin. The acoustic behavior of the AT1 transient group in Prince William Sound, Alaska. To be submitted to Animal Behavior.

PROFESSIONAL CONFERENCES

Bienniel Conference of the Biology of Marine Mammals, Vancouver, B.C. Canada November 2001

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

The monitoring of killer whales and analysis of historic and current data on killer whale behavior is part of an program to investigate killer whale recovery and the interactions of killer whales and harbor seals. It will be integrated with the harbor seal trophic studies (Kathy Frost, project leader). In FY2001 this project will rely on approximately $9,000 in matching funds from other sources. As a non-profit research institution familiar with private funding sources and cooperative programs, NGOS can work with the Trustee Council cooperation to maximize potential for other funding in the future.

PROPOSED PRINCIPAL INVESTIGATOR:

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KEY PERSONNEL

Craig Matkin (M.S. University of Alaska), is the project leader. Matkin will be responsible for supervising the completion of all fieldwork and insuring successful operation of boats and equipment. He will be the operator of the R.V. *Windwalker* and supervise directly all work completed from that platform. He will direct data analysis and assemble all material for annual and comprehensive reports and be responsible for completion and submission of these reports. He will represent this project and present the work to the EVOS Trustee Council.

Matkin has studied killer whales in Prince William Sound since 1977. He initiated systematic killer whale photoidentification in Prince William Sound, and is a founding

member of NGOS. In 1994 he completed the "The Biology and Management of Killer Whales in Alaska" for the U.S. Marine Mammal Commission. Other pertinent publications include EVOS killer damage assessment results ("The Status of Killer Whales in Prince William Sound 1984-1992", Craig O. Matkin, G. M. Ellis, M.E. Dahlheim, and J. Zeh in T.R. Loughlin. ed. Marine Mammals and the *Exxon Valdez* and Matkin and C.O., Matkin, D.R., Ellis, G.M. , Saulitis, E. and McSweeney, D. 1997. Movements of resident killer whales in Southeastern Alaska and Prince William Sound, Alaska. Marine Mammal Science, 13(3):469-475. Mr. Matkin also teaches at the University of Alaska, Lower Kenai Penninsula Campus.

Eva L. Saulitis (M.S. University of Alaska) , a director of NGOS, has conducted fieldwork on killer whales in Prince William Sound each season since 1987. She is a principal field biologist for the monitoring segment of this project (photoidentification) and will co-operate the research vessel *Whale 2* aid in maintanance of the remote hydrophone. She will make ready and maintain all necessary equipment, complete photoidentification work and all logs and data sheets as required. She will provide entry of field data into the GIS system.

Saulitis completed her MS thesis "The Behavior and Vocalizations of the AT Group of Killer Whales in Prince William Sound, Alaska." in 1993. She coauthored the "Biology and Management of Killer Whales in Alaska" for the U.S. Marine Mammal Commission and "Killer Whales" for the EVOS Restoration notebook series and authored Saulitis, E.L., C.O. Matkin, K. Heise, L. Barrett Lennard, and G.M. Ellis. 2000. Foraging strategies of sympatric killer whale (*Orcinus orca*) populations in Prince William Sound, Alaska. Marine Mammal Science16(1):94-109. She has done extensive analysis of killer whale calls and has operated research vessels in Prince William Sound since 1988.

Graeme Ellis has participated in killer whale photoidentification studies in Canada and Alaska for 24 years. Ellis will do all final identifications of individual killer whales. He will examine all negatives on a repetitive frame by frame basis and supervise the input of the final identification data into the VAX computer system. With Matkin he will update all life history information on individual whales and provide positive identifications from photographs of each whale biopsied.

Currently Ellis directs whale identification work at the Pacific Biological Station in Nanaimo, British Columbia and has done final identifications on Prince William Sound killer whale photographic negatives since 1983. He has more experience than any other individual identifying Prince William Sound killer whales from photographic negatives and his accuracy has been certified by repeated testing.

Harold Jurk Harald is a Phd. candidated at the University of British Columbia and specalizing in cetacean acoustics. He is conducting analysis and interpretation of killer whale acoustic data collected over the past 13 years in Prince William Sound/Kenai Fjords from vessels and from remote hydrophones.

LITERATURE CITED

Matkin, C.O., G. Ellis, M. Dahlheim, and J. Zeh. 1994. Status of killer whales in Prince William Sound, 1984-1992. in T. Loughlin, ed. Marine Mammals and the *Exxon Valdez*. Academic Press, San Diego, CA.

Saulitis, E. 1993. The behavior and vocalizations of the AT1 group of transient killer whales in Prince William Sound, Alaska. MSC. Thesis, Institiute of Marine Science, University of Alaska, Fairbanks.

Ford, J.K.B. 1991. "Vocal traditions among resident killer whales (Orcinus orca) in coastal waters of British Columbia." Can, J. Zool. 69:1454-1483

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Proposed Project Manager
Bruce Wright
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Approved TC 6-3-00

FY 01 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel		$0.0
Travel		$0.0
Contractual		$69.6
Commodities		$0.0
Equipment		$0.0
Subtotal		$69.6
General Administration		$4.9
Project Total		$74.5
Full-time Equivalents (FTE)		
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FFY 2002

Dollar amounts are shown in thousands of dollars.

Comments:

2001

Project Number: 01012
Project Title: Killer Whale Monitoring
Agency: NOAA

FORM 3A
SUMMARY

4-15 F'6
approved 8-3-00

2001 EXXON VALDEZ TR_ _ _EE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY2000	Proposed FY2001
Personnel		$28,990.0
Travel		$1,700.0
Contractual		$25,000.0
Commodities		$7,590.0
Equipment		$0.0
Subtotal	$0.0	$63,280.0
Indirect		$6,328.0
Project Total	$77,479.0	$69,608.0
Full-time Equivalents (FTE)		8.5
	Dollar amounts are shown in thousands of dollars.	
Other Resources		$9,500.0

LONG RANGE FUNDING REQUIREMENTS

	Estimated FY2002	Estimated FY2003	Estimated FY2004	Estimated
	$72,000.0	$75,000.0	$80,000.0	

Comments:

+ $4,900 GA (NOAA)

TOTAL: $74,500

2001

Prepared: April 2000

Project Number: ~~00112~~ 01012A
Project Title: Killer Whale Monitoring
Name: North Gulf Oceanic Society

FORM 4A
Non-Trustee
SUMMARY

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FY 1998
Craig O. Matkin	P.I. Field Biologist		3.0	4400.0		13,200.0
Graeme Ellis	Photo Analyst		1.0	3500.0		3,500.0
Eva Saulitis	Field Biologist		2.5	2800.0		7,000.0
	Field Assistant		0.7	1500.0		1,050.0
	Data entry technician		0.3	2800.0		840.0
	Acoustic Analyst		1.0	3400.0		3,400.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		8.5	18400.0	0.0	
					Personnel Total	$28,990.0

Travel Costs:		Ticket	Round	Total	Daily	Proposed
Description		Price	Trips	Days	Per Diem	FY 1998
Homer/Vancouver (RT) CONFERENCE		650.0	1	5	90.0	1,100.0
Homer/AnchorageRT		150.0	2	3	100.0	600.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1,700.0

2001

Prepared:

Project Number: 00112
Project Title: Killer Whale Monitorng
Name: North Gulf Oceanic Society

FORM 4B
Personnel
& Travel
DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FY 1998
Description	
Sea More Wildlife	
Hydrophone/ equipment lease/ maintenance	4,000.0
34' research vessel (Windwalker) 50 days@ 420/day	21,000.0
Contractual Total	$25,000.0

Commodities Costs:	Proposed FY 1998
Description	
Phone	280.0
Field Food ($16/person/day)	1,800.0
E-mail/Computer	120.0
Fuel	3,000.0
Film/Processing/Printing	1,600.0
Field Supplies	320.0
Shipping	470.0
Commodities Total	$7,590.0

2001

Prepared:

Project Number: 00112
Project Title: Killer Whale Monitoring
Name: North Gulf Oceanic Society

FORM 4B
Contractual & Commodities DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 1998
			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	
	1	
	1	

2000

Prepared: 7/8/99

Project Number: 00012
Project Title: Killer Whale Monitoring
Name: North Gulf Oceanic Society

FORM 4B
Equipment
DETAIL

Revision 7-11-00
Approved TC 8-3-00

Community Involvement Planning for GEM

Project Number:	01052
Restoration Category:	General Restoration
Proposer:	P. Brown- Schwalenberg/CRRC
Lead Trustee Agency:	ADFG
Cooperating Agencies:	None
Alaska SeaLife Center:	No
New or Continued:	Cont'd
Duration:	7th yr. 8 yr. project
Cost FY 01:	$201.9
Cost FY 02:	$180.0
Geographic Area:	All
Injured Resource/Service:	Subsistence

ABSTRACT

In FY 01, this project will continue to actively involve residents of Tatitlek, Chenega Bay, Port Graham, Nanwalek, Cordova/Eyak, Seward, Seldovia, Valdez, Kodiak/Ouzinkie, and Chignik Lake in the restoration program through a network of local facilitators. In addition, the project will work to address the future of community involvement with regard to the Gulf Ecosystem Monitoring (GEM) program, the Trustee Council's long-term research and monitoring program. In FY 01, the Community Natural Resources Coordinator (formerly the Spill Area-Wide Community Involvement Coordinator), the TEK Specialist, a contracted science advisor, and the community facilitators will focus on three objectives: (a) designing a community based monitoring program, (b) identifying specific monitoring activities that may fit within the GEM program, and (c) developing possible pilot projects for FY 02.

In 1999, the EVOS Trustee Council declared its intent to undertake a program of long-term monitoring and research in the northern Gulf of Alaska. Known as the Gulf Ecosystem Monitoring (GEM) program, the effort will provide sustained, inflation-proofed funding for studies designed to "foster a healthy and biologically diverse marine ecosystem in the northern Gulf of Alaska through greater understanding of how its productivity is influenced by natural changes and human activities." Central to the success of this program will be studies designed to track the condition of the different coastal environments in the spill affected region each year, and the status of selected resources of high value to subsistence, sport, and commercial users.

This proposal is designed continue with the original community facilitation efforts and objectives, but to a lesser extent since the Trustee Council is winding down. In addition, this proposal builds on the initial work in FY00 to enhance the stewardship capacity of the Native community and create a long-term community monitoring component. Candidate projects emerging from our planning effort will exhibit a blend of modern measurement science and traditional observation.

Ten local facilitators were hired in FY97 through cooperative agreements with the village councils of Tatitlek, Chenega Bay, Port Graham, Nanwalek, Eyak (Cordova), Ouzinkie, Qutekcak (Seward), Valdez, and the Chignik Lake Tribal Council to involve communities in the EVOS restoration process. Hugh Short, the current Spill Area Wide Community Involvement Coordinator, will be leaving prior to October 1, 2000. CRRC will hire a new Natural Resource Coordinator in the summer of 2000 to continue to coordinate the project out of the Restoration office, to accomplish the following tasks:

1. Continue the involvement of community members and local tribal traditional natural resource programs throughout the spill region in current restoration projects. This community process will require a Community Facilitator, whose duties are described later. Since the restoration effort is declining, this will be a smaller function in FY01.

2. Serve as contact point for the Community Facilitator and Natural Resource Specialist in each of ten participating communities (Tatitlek, Chenega Bay, Port Graham, Nanwalek, Cordova, Seward, Seldovia, Valdez, Ouzinkie, and Chignik Lake). The tasks for the Spill Area Wide Community Development Coordinator in relation to the Community Facilitators will be to:

    a. Once a month, fax a brief activities report to the Community Facilitators and Tribal Natural Resource Management programs to keep them informed of Trustee Council actions, Restoration Office activities, upcoming events, new research finding, and all other pertinent information. The report could take the form of bullets or a newsletter with contact information on each issue.

    b. Coordinate the participation of the Community Facilitators in the annual restoration workshop, serve as the lead coordinator for the Monitoring Committee planning effort.

3. Provide input at the Restoration Work Force and PAG meetings.

4. Assist in organizing Trustee Council/Restoration Office community meetings. This may include arranging presentations in specific communities.

5. Attend (in person or by teleconference) all Trustee Council meetings and report to the Community Facilitators on actions taken.

6. Coordinate and provide technical assistance to the villages to develop project proposals.

7. Prepare quarterly project status reports and ensure all annual/final reports are submitted on a timely basis by the affected communities.

The specific tasks the Community Facilitators are expected to undertake include the following:

1. Inform the Spill Area Wide Coordinator of community issues, concerns, or questions regarding restoration. These issues could be identified through community meetings conducted by the Community Facilitators, or through other means, and could include ideas for new projects.

2. Work with the Spill Area Wide Coordinator in coordinating Trustee Council community meetings as well as community visits from project PIs. The Community Facilitator will also serve as the initial contact in the village for any project conducted in the traditional use areas of the communities.

3. Work closely with the village council's tribal traditional natural resource program to coordinate all activities that have a direct impact the local community resources and any research projects that will complement the tribe's traditional knowledge of the traditional use areas.

4. Disseminate to community members the monthly update from the Spill Area Wide Coordinator.

5. Attend the annual Restoration Workshop and associated meetings, including certain scientific review sessions.

6. Provide a quarterly report to the Spill Area Wide Coordinator identifying community issues, concerns, or questions regarding restoration. These issues could be identified through community meetings or other means and should include relevant issues discussed at village council meetings. Ideas for new projects should also be included. These tasks will decline as the overall restoration program declines.

Five communities will continue as pilot project communities. In FY00, these communities prepared GEM integration plans, which will serve as the basis for identifying specific monitoring activities and the relationship of those activities and other needs for the management plans and GEM. These pilot communities are funded at a higher level to pay for the additional work required. In FY00, the pilot communities, as well as some other communities traveled to Lac du Flambeau, Wisconsin to observe the natural resource research and monitoring programs currently underway. This was in an effort to model the tribal natural resource programs in the spill area after these programs and be more involved in the community monitoring aspects of the Gulf Ecosystem Monitoring plan. Specific tasks for the pilot project communities will be to participate in the workshops held in the communities and work with the project staff to develop common areas of interest between the tribal natural resource programs and GEM program. Once these common areas of interest are found, the scientific staff and communities will develop methods by which communities can take on specific monitoring activities of GEM, while leverage other funds to implement other aspects of the monitoring.

The specific tasks for the Traditional Ecological Knowledge Specialist will be to:

1. Assist in developing the community monitoring program, especially exploring opportunities for incorporating community expertise and TEK into the monitoring program as a whole as well as into specific monitoring activities.

2. Assist other PIs as requested in incorporating TEK into their proposals and research as appropriate and working with Tribal natural resource programs.

3. Assist spill area communities and the Community Facilitators as requested in developing methods for documenting TEK and otherwise incorporating it into research and monitoring programs related to the Restoration Program and GEM.

4. Provide other assistance as necessary to the project and to the Community Development Coordinator.

The specific tasks for the Scientific Advisor will be to:

1. Help develop the conceptual outline for a comprehensive community-based monitoring program in the five pilot project communities. This will include helping to determine appropriate parameters to be monitored and appropriate methods for doing so, including identification of any necessary training.

2. Help coordinate these community-based monitoring with other research and monitoring activities planned under GEM and coordinate community input in the GEM plan.

3. Help develop additional monitoring ideas outside of GEM to meet community interests in resource stewardship.

4. Serve as the liaison with other scientists as appropriate to get input in the design and implementation of the program.

NEED FOR THE PROJECT

A. Statement of Problem

The *Exxon Valdez* oil spill caused severe disruption of the lives of many people living in the spill impacted area. The spill also caused residents of the area to be concerned about the safety of their wild food sources, and the integrity of the surrounding natural environment. While scientific studies aimed at restoring the resources and services damaged by the oil spill have occurred throughout the spill area, most of the researchers work for agencies or institutions based in Anchorage, Fairbanks, or outside Alaska. Residents have voiced concern over a lack of involvement by spill area communities in the restoration efforts, and incomplete communication to spill area inhabitants of study proposals and results. While the past several years have facilitated an increasing amount of communication between the scientists and the communities, there still exists a void for meaningful involvement in the restoration process by the community members at the grass roots level. At the same time, researchers have

recognized that local residents have traditional knowledge that could help them answer questions they have not been able to answer through conventional scientific means.
In addition, communities in the spill area are very concerned about the long-term stewardship and management of lands and resources important to the subsistence way of life. These communities have been developing their tribal natural resource management programs at the local level to ensure long term health of injured oil spill species, important subsistence resources, and responsible management of lands in proximity to their villages and traditional use area. The Gulf Ecosystem Monitoring Plan is also very concerned with the ecosystem and coordination between the communities and the Trustee Council regarding community-based monitoring and will be necessary to effectively monitor and document change in the Gulf of Alaska ecosystem. The integration of tribal natural resource programs, citizen monitoring, and GEM must take place.

Marine bird, fish and mammal stocks are believed to be profoundly influenced by the marine environment that hosts them and the food-webs that support their production. Variations in annual production and species composition associated with cycles and shifts in ocean climate have been documented. To meet the mission of GEM, the physical condition of the northern Gulf of Alaska and selected target populations must be carefully tracked through time. The emerging "historical records" provide important insight about how the ecosystem responds to environmental fluctuations on scales from weeks and months to decades and ideally centuries. GEM monitoring will be strengthened significantly by the addition of coastal observations in the many sub-environments stretching from Prince William Sound to the Alaska Peninsula. There is a critical need to establish a long-term observational program in coastal waters because the edge-zone of the northern Gulf is used by many sport, subsistence and commercial resources as reproductive and nursery habitat.

B. Rationale

This project furthers the Trustee Council's goals of facilitating the involvement of spill area residents and resource users in the restoration process. It also reaffirms the Trustee Council's dedication to the involvement of people living in the oil spill affected areas in the restoration process. In addition, people living in the spill area have detailed knowledge about the condition of resources, which can significantly add to data collected as part of scientific studies, and enhance the success of restoration efforts. Local people have expressed a desire to be involved in all aspects of restoration projects, and a willingness to work with researchers. GEM must integrate local resource management plans and programs into the overall program to effectively monitor environmental conditions and indicator species. This project would open up the process and bring everyone to the table.

At present, the only systematic and year-round monitoring program of ocean conditions in the northern Gulf of Alaska is maintained in outer Resurrection Bay by the Institute of Marine Science, University of Alaska Fairbanks (GAK-1 station) and in Cook Inlet by Cook Inlet Keepers. Also, some seasonal records of temperature and plankton volumes have been made over the years by aquaculture corporations in Prince William Sound, lower Cook Inlet, and at Kodiak. These observations, coupled with those undertaken by several private organizations in the region provide evidence that citizen monitors can be important contributors to long-term programs, but also demonstrate that to be effective, these efforts must be standardized and coordinated over time. It is our belief that resource managers charged with sustaining important coastal resources will benefit from any new information arising from serious coastal monitoring programs.

Tribes in the Chugach Region are in the process of developing Tribal Natural Resource Programs. These programs are developing methods and projects that will ensure the continued abundance of subsistence resources important to their communities. Five of those plans will be close to completion in FY00. They form the basis for development of comprehensive integrated resource management plans. The Integrated Resource Management Plans will be a larger document of overall interests of the communities, including economic development, traditional use area management, and various other aspects of their natural resource programs. Both the GEM Integration Plans and the Integrated Resource Management Plans will be instrumental with planning the GEM community-based monitoring programs.

In FY00, workshops were held to increase the capacity of communities in the Chugach Region and spill area to increase their ability to ensure subsistence resource forever. This included a workshop in December with village corporations and tribes to discuss ways of cooperative management of village corporation's lands. Experts in the field, including David Case, Sam Fortier, the Native Village of Emmonak and Emmonak Corporation, and the RuralCAP organization presented methods of collaboration. Strategies of ways to work together to ensure the stewardship of lands were discussed and relationships built.

Additionally, the corporations and tribes in Prince William Sound have been working extensively with the United States Forest Service to ensure their involvement in the Chugach National Forest Management Plan Revision currently underway. Cooperative and collaborative management of lands and resources have been actively discussed and strategies for further developing formal relationship is underway.

C. Location

This project will be spill area wide. All communities will have a Community Facilitator within their community, with the exception of the Alaska Peninsula and Kodiak, which will be covered by a region-wide Community Facilitator. Five communities will be pilot project communities. These include Tatitlek, Eyak, Port Graham, Nanwalek, and Ouzinkie. Valdez, Chenega Bay, Alaska Peninsula, Qutekcak, and Seldovia will continue to perform their normal Community Facilitator duties. Other regional and community organizations will be encouraged to participate and mold the parameters for the monitoring program.

The project's benefits will be realized both in the communities involved and in the restoration of the injured resources. Better communication among the Trustee Council staff, researchers, and residents of the communities impacted by the spill should improve the effectiveness of restoration efforts.

COMMUNITY INVOLVEMENT

The core of this project is community involvement.

PROJECT DESIGN

A. Objectives

The objectives of the project will be to:

1. Increase the meaningful involvement of spill area communities in the restoration efforts of the Trustee Council;

2. Improve the communication of findings and results of restoration efforts to spill area village councils and inhabitants and the appropriate regional organizations. It is expected that by doing so, this project will increase the effectiveness of overall restoration efforts; and
3. Develop a means by which western science and traditional ecological knowledge and wisdom can be compiled and utilized in a cooperative manner with the intent of furthering the restoration process in a way that is sensitive to the needs of the affected communities.

4. Provide community input into the plans for GEM, including review of drafts and suggestions for community-based activities such as monitoring, education, data sharing, and outreach. Part of this objective will be met in the workshops to be held in October 2000 in Anchorage and in specific communities at other times, and part will be accomplished by correspondence between Project Staff. Communities' monitoring programs, developed in conjunction with their tribal natural resource management plans, will include more than is relevant to GEM. This activity will help promote close cooperation in the development of monitoring ideas under GEM and otherwise, so that the programs and projects that are undertaken benefit each other as much as possible.

5. Use the above to help further the design of community-based monitoring program. A community-based or citizen monitoring program requires mechanisms for (a) identifying and selecting monitoring activities, (b) developing appropriate methods for the various parameters to be monitored, (c) training monitors and ensuring the quality of data collected, (d) submitting, managing, archiving, and accessing the data generated, (e) providing results and other feedback to monitors, and (f) evaluating the approach and results of the monitoring effort on a regular basis. In FY01, this project seeks to develop a conceptual model for the structure, scope, scientific guidance, community involvement, cost, funding, and other aspects of establishing and maintaining a community-monitoring program.

6. Identify specific monitoring activities. There are many factors that can be monitored in the northern Gulf of Alaska. We will develop as comprehensive a list as possible of the parameters that can be monitored, the rationale for monitoring them, the feasibility (including cost) of monitoring them as part of a community-based program, and other factors that will help decide what will actually be monitored. The list will identify (a) those activities that comprise a minimum monitoring effort, (b) those activities that relate specifically to the Gulf Ecosystem Monitoring Program (GEM), and (c) other activities that are important to the communities but not funded by EVOS. This effort needs to be closely coordinated with GEM planning as well as with other state and federal efforts.

7. Select possible monitoring activities for pilot projects in FY02. After designing the program and identifying what can be monitored, we will select certain monitoring activities to carry out in FY02 (i.e., to include in our proposal for FY02) to test the system. This test will help us evaluate and refine our overall program and aid in the selection of long-term monitoring activities under GEM as well as under other funding programs.

B. Methods

The Spill Area-Wide Coordinator hired by Chugach Regional Resources Commission, the local Community Facilitators, in close coordination with the Tribal Natural Resource Programs, will implement the project. Additionally, outreach to all parties involved in community monitoring programs throughout the spill area will be invited and encouraged to participate in the process of developing the parameters of the program.
The objectives will be achieved using the following methods:

1. A contract will be renewed by ADF&G Subsistence Division to CRRC for overall coordination of the Community Facilitators and Spill Area-Wide Coordinator. The contractor will be expected to arrange for the hiring (where applicable) and coordination of local facilitators in the communities of Chenega Bay, Tatitlek, Port Graham, Nanwalek, Cordova, Seward, Valdez, Seldovia, and regional coordinators for the Kodiak Island and Alaska Peninsula regions.

2. Working with the Community Facilitators, the Spill Area-Wide Coordinator will work to further the goal of community outreach. The goal of community outreach will be to continue the partnership begun under 95052 between the people of the oil spill region and scientific researchers. Outreach will include communication of traditional knowledge and local interests, as well as communication of research proposals and study results. Outreach and community interest in the Gulf Ecosystem Monitoring program (GEM) will be a large effort of the Spill Area Wide Coordinator.

3. Provide input into the development of draft GEM monitoring plan. Participate in October workshop – help define community monitoring and stewardship aspects of the GEM plan. To meet our first objective, we will begin with a scoping meeting to be held in conjunction with and as part of the EVOS-GEM Workshop scheduled for October 10-11, 2000. Tribal Natural Resource Management Plans developed in FY00 in the Community Involvement Project and in their programs will be used to determine the areas of interest, ongoing research and monitoring projects undertaken by communities, and the goals and long-term plans of the programs. We will also review the latest draft of the GEM implementation plan, which should be distributed in late September.

   Use results of #3 to help further design a community-based monitoring program for five communities. We will invite scientists working on the design of GEM and especially its data management procedures. At this meeting, we will develop the conceptual outline of a monitoring program, addressing the points outlined in the Objectives section above. The Community Development Coordinator, TEK Specialist, selected Community Facilitators, and the Scientific Advisor will prepare for the meeting and be responsible for using the results of the workshop to develop a detailed model for the monitoring program. We will hold individual work sessions in the five pilot project communities.

4. Select activities for pilot projects in FY02. By March 2001, we will select pilot projects for FY02. These projects will be chosen on the basis of their relevance to community interests, their scientific merit, and their ability to help evaluate the design of the monitoring program as a whole. This may or may not include monitoring and focus instead on some other part of GEM.

5. Further work in FY01. Once we have accomplished the above tasks, we will continue its work after submitting a proposal for FY02. Depending on the outcome of the above activities, we may do one or more of the following: (a) identify other sources of funding for monitoring activities, (b) continue to refine the ideas presented in the monitoring program design and the specific monitoring activities,

(c) explore closer ties with monitoring plans by scientists involved with GEM and others, and (d) explore closer ties with community-based resource management programs, tribal natural resource programs, and citizen monitoring projects currently being developed.

C. Contracts and Other Agency Assistance

A contract will be let to CRRC for overall coordination of a facilitator network through a Spill Area-Wide Coordinator. The contractor will be expected to arrange for the hiring and coordination of local facilitators in the communities of Chenega Bay, Tatitlek, Port Graham, Nanwalek, Cordova, Seward, Valdez, Seldovia, and regional coordinators for the Kodiak Island and Alaska Peninsula regions. However, all other communities in the oil spill impacted area will also be included in outreach efforts, even though a local facilitator will not be hired in each community.
Additionally, CRRC will contract with Dr. Henry Huntington to serve as the TEK Specialist and Dr. Ted Cooney to serve as the Science Advisor.

D. Completion Date

Since the objective of this project is to integrate the GEM with tribal natural resource programs and other community resource programs we see a need to continue this program until the spill restoration project is complete. The project should be evaluated on a yearly basis to determine how it can best serve the needs of the Trustee Council and the local communities.

SCHEDULE

A. Measurable Project Tasks for FY97

October 1, 2000	Contract with CRRC and ADF&G Renewed
October 1, 2000	SAWCDC continues CRRC employment
October 1, 2000	Subcontracts with Communities for Community Facilitators developed or renewed
October 1, 2000	Contract with TEK Specialist renewed
October 1, 2000	Contract established with Science Advisor
October 1-31, 2000	MOU renewed between ADF&G & CRRC
Early October 2000	SAWNRC, TEK Specialist, and Science Advisor prepare for monitoring workshop by developing parameters to be included in the GEM plan
October 9, 2000	Workshop held with Project Staff and others to review GEM draft and provide input, refine list of community interests and objectives, prepare for EVOS workshop
October 10-11, 2000	Participate in EVOS-GEM workshop, developing overall ideas for data archiving and access, citizen and community monitoring, and ideas and needs shared with other aspects of GEM
November to Jan. 2001	Individual workshops held in five communities to review model, identify activities, and provide further input to latest GEM draft
Winter 2001	List of activities compiled, organized, and evaluated

March-April 2001	Proposals for pilot projects for FY02 prepared and submitted
Spring-Summer 2001	Model and list of activities completed and refined, other sources of funding sought, and links to community programs and scientific activities explored.

B. Project Milestone and Endpoints

October 2000	Contracts in place First workshop completed Input into GEM draft plan prepared
January 2000	Workshops in five communities held. Individual community plans developed.
March 2001	Pilot projects identified and selected
April 2001	Pilot project proposals submitted
September 2001	Final report prepared

C. Project Reports

Annual reports will be compiled in coordination with the ADF&G and provided each year by CRRC on April 15th, describing and summarizing the progress made during the previous federal fiscal year. In addition, monthly reports will be provided to the participating communities by the Spill Area-Wide Coordinator.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This community outreach effort is in fact a novel effort to coordinate the Restoration Program with the traditional natural resource programs and builds on the established relationship between CRRC and the communities in Prince William Sound. Other organizations may be included, such as the tribal natural resource programs, Cook Inlet Keepers, Regional Citizen Advisory Councils, Kachemak Bay Research Reserve, Alaska Wilderness Recreation and Tourism Association, and various other organizations.

CRRC is contributing a considerable amount of in-kind services to the project. CRRC's tribal traditional natural resource program development project has been operating for the past two years in four of the villages in the Chugach Region, and Ouzinkie. CRRC, through a BIA contract, is technical assistance in the villages to four natural resource specialists. The Native American Fish & Wildlife Society to provide training and technical assistance at the local level. Part of the normal duties of the Natural Resource Specialists will be to collect traditional harvest and other baseline data (such as population assessments) on the resources in their traditional use areas.

ENVIRONMENTAL COMPLIANCE

This project is categorically excluded under NEPA guidelines.

PERSONNEL

Patty Brown-Schwalenberg: Ms. Brown is the Executive Director of the Chugach Regional Resources Commission (CRRC). She has worked for the past 17 years in such positions as Tribal Administrator for her tribe, the Lac du Flambeau Band of Lake Superior Chippewa Indians, Society Administrator for the Native American Fish & Wildlife Society, Office Manager of the Bering Sea Fisheries Development Fund, and as a private consultant, assisting Alaska Native communities in obtaining funding for natural

resource management programs, and setting up their natural resource program administrative systems. CRRC and the previous organizations that Ms. Brown has operated have consistently met all standards of proper management, including annual program and financial audits.

Spill Area Wide Natural Resources Coordinator – currently being recruited.

Dr. Henry Huntington: CRRC has contracted with Huntington to serve as a TEK Specialist. Dr. Huntington received his Ph.D. at the University of Cambridge (U.K.), Scott Polar Research Institute in Polar Studies. He has served as the Environmental Coordinator for the Inuit Circumpolar Conference (ICC), coordinating ICC policy regarding the Arctic Environmental Protection Strategy (AEPS), in cooperation with indigenous organizations in Russia and Scandinavia. He was also responsible for traditional ecological knowledge and other research projects under the auspices of the AEPS.

Dr. Ted Cooney: Dr. R. Ted Cooney has recently retired from the University of Alaska-Fairbanks where he served on the faculty as a biological oceanographer for 29 years. Dr. Cooney has been involved with many studies of Alaska oceanic, shelf and coastal zooplankton stocks. He has worked on, and published extensively in the area of salmon oceanography. Most recently, Dr. Cooney was designated by the EVOS Trustee Council as the Lead Scientist for the Sound Ecosystem Assessment (SEA) Program in Prince William Sound, 1994-1999. His work with the juvenile salmon ecosystem over a 20-year period helped to create the spring-time plankton watch at hatcheries operated by the Prince William Sound Aquaculture Corporation.

Revision 7-11-00
Approved TC 3-00

2001 EXXON VALDEZ TRUST COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 1999	Proposed FY 2000
Personnel		$0.0
Travel		$0.0
Contractual		$188.7
Commodities		$0.0
Equipment		$0.0
Subtotal	$0.0	$188.7
General Administration		$13.2
Project Total	$0.0	$201.9
Full-time Equivalents (FTE)		0.0
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

		Estimated 2002	Estimated 2003		
		$200.0			

Dollar amounts are shown in thousands of dollars.

Comments:

FY01

Prepared: 6-1-00

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

2001 EXXON VALDEZ TRU: COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2000
						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		0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 2000
					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

FY01

Prepared: 6-1-00

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

2001 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed
Description	FY 2000
Contract with Chugach Regional Resources Commission	188.7
	0.0
	0.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$188.7

Commodities Costs:	Proposed
Description	FY 2000
Commodities Total	$0.0

FY01

Prepared: 6-1-00

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 3B
Contractual & Commodities DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2000
			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

FY01

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 3B
Equipment
DETAIL

Prepared: 6-1-00

2001 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 1999	Proposed FY 2000						
Personnel		$37.5						
Travel		$22.1						
Contractual		$110.0						
Commodities		$2.0						
Equipment		$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$0.0	$171.6			Estimated 2002	Estimated 2003		
Indirect		$17.1						
Project Total	$0.0	$188.7			$200.0			
Full-time Equivalents (FTE)		0.8						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

FY01

Prepared: 6-1-00

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 4A
Non-Trustee
SUMMARY

2001 EXXON VALDEZ TRU COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:			Months	Monthly		Proposed
	Name	Position Description	Budgeted	Costs	Overtime	FY 2000
	Currently being recruited	Natural Resources Coordinator	9.0	4.1	0.0	37.5
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	9.0	4.1	0.0	
					Personnel Total	$37.5

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FY 2000
	Port Graham - Anchorage	0.2	2	8	0.1	1.2
	Tatitlek - Anchorage	0.5	2	8	0.1	1.8
	Chenega Bay - Anchorage	0.5	2	8	0.1	1.8
	Seldovia - Anchorage	0.3	2	8	0.1	1.4
	Nanwalek - Anchorage	0.2	2	8	0.1	1.2
	Seward - Anchorage	0.2	2	8	0.1	1.2
	Cordova - Anchorage	0.3	2	8	0.1	1.4
	Valdez - Anchorage	0.2	2	8	0.1	1.2
	Ouzinkie - Anchorage	0.7	2	8	0.1	2.2
	Chignik Lake - Anchorage	0.7	2	8	0.1	2.2
	TEK Specialist/Community Involvement Coordinator travel throughout					6.5
	spill area					0.0
					Travel Total	$22.1

FY01

Prepared: 6-1-00

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 4B
Personnel
& Travel
DETAIL

2001 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET
October 1, 2000 ..ptember 30, 2001

Contractual Costs:	Proposed
Description	FY 2000
TEK Specialist	20.0
Sub-contracts with tribal councils in spill area (10 at $3,000) to provide facilitator and stewardship services	30.0
Sub-contracts with tribal councils in spill area (5 at $2,000) to participate in GEM planning and implementation	10.0
Sub-contracts with tribal councils in spill area (5 at $4,000) for natural resource plan development/integration with GEM	20.0
Science Advisor and additional consulting on community-based management and monitoring	30.0
Contractual Total	$110.0

Commodities Costs:	Proposed
Description	FY 2000
Incidental costs for workshops (meeting space rental, supplies, food, etc.)	2.0
Commodities Total	$2.0

FY01

Prepared: 6-1-00

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 4B
Contractual & Commodities DETAIL

New Equipment Purchases:	Number of Units	Unit Price	Proposed FY 2000
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 placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage:	Number of Units	
Description		

FY01

Project Number: 01052
Project Title: Community Involvement and GEM Planning
Agency: Alaska Department of Fish and Game

FORM 4B
Equipment
DETAIL

Prepared: 6-1-00

01100

Approved TC 8-3-00

Public Information, Science Management and Administration

Project Number:	01100
Restoration Category:	Public Information, Science Management and Administration
Proposer:	Restoration Office
Lead Trustee Agency:	All Trustee Agencies
Alaska SeaLife Center:	No
Duration:	Ongoing
Cost FY 96:	$3,439,600
Cost FY 97:	$2,940,500
Cost FY 98:	$2,796,300
Cost FY 99:	$2,495,700
Cost FY 00:	$2,033,900
Cost FY 01:	$1,500,000
Cost FY 02:	TBD
Geographic Area:	N/A
Injured Resource/Service:	All

ABSTRACT

Project 01100 provides overall support for science management, public involvement and administration of the restoration program through the Restoration Office. This includes funding support for the Trustee Council staff working at the direction of the Executive Director, management of the scientific peer review process, public involvement efforts including the active participation of the 17-member Public Advisory Group (PAG), and support for Trustee agency participation in the restoration program.

Prepared: 7/25/00

INTRODUCTION

The Trustee Council, established under the terms of a court approved civil settlement in 1991, is comprised of six members: the Commissioner of the Department of Environmental Conservation; the Commissioner of the Department of Fish and Game; the Attorney General of the State of Alaska; the Secretary of the Department of the Interior; the Secretary of the Department of Agriculture; and the Director of the National Oceanic and Atmospheric Administration. The Public Information, Science Management and Administration project (01100) provides for overall implementation of the restoration program.

This project makes extensive use of existing Trustee Council agency structures to keep administrative costs to a minimum. The proposed Project 01100 budget continues to make reductions in administrative and management costs as the overall work plan is reduced as directed by the Trustee Council. As proposed for FY 01, the budget of $1,500,000 has been reduced $533,900 below the FY 00 authorized amount.

Components of the 01100 Public Information, Science Management and Administration project include:

Chief Scientist and Peer Review Process - The Trustee Council and principal investigators need access to the best possible scientific knowledge and understanding concerning injured resources and services. This information has been provided continuously by the Chief Scientist and expert peer reviewers since the damage assessment process started in 1989. The Chief Scientist draws upon a variety of qualified individuals with expertise in specific fields who provide individual reviews of project proposals as well as peer review of annual and final project reports. As proposed for FY 01, the budget of $312,100 has been reduced $50,000 below the FY 00 authorized amount.

Restoration Office - The Restoration Office component includes funding for the Executive Director and staff. The Restoration Office provides for basic restoration program planning and implementation; intergovernmental and interagency coordination; public information; and overall program management functions of the Trustee Council. Restoration Office staff maintain the Trustee Council's financial records including preparation of the monthly, quarterly and annual financial reports; provide a quarterly report regarding the status of projects funded by the Trustee Council; and work closely with the Chief Scientist in facilitating the scientific review and evaluation process.

This project also provides funding for public involvement and outreach, including funding associated with public meetings and the annual workshop; public notice and advertising expenses; production of work plan documents (i.e., annual Invitation, Draft Work Plan, Final Work Plan, Annual Report); the Restoration Update newsletters; the Restoration Notebook series; other publications; and postage for mailings. Funding is

also included for the annual external audit. In addition, this project includes funding for lease and operating costs for the Anchorage Restoration Office (645 G Street).

In FY 01, three positions have been deleted from the Restoration Office: the Director of Administration, the Administrative Manager and the Communications Coordinator. In addition, the Juneau Office will be permanently closed.

Public Advisory Group - The Public Advisory Group (PAG) consists of 17 members, and two *ex-officio* members from the Alaska State Legislature. The PAG includes representatives of major interest groups (e.g., tourism/recreation, commercial fishing, Native landowners, forest products, subsistence, local government, science and academia) and five members representing the public-at-large. The PAG helps ensure meaningful public involvement by providing guidance and input to the Trustee Council on such items as the annual work plans, budgets, and overall implementation of the *Restoration Plan.*

Liaison Support - The FY 01 budget for Liaison Support includes funding for Trustee agency liaisons as well as travel costs for Trustees to attend Council meetings. Consistent with reductions to the overall work plan, liaison support for FY 01 has been reduced from four months to two months. In addition, travel funds have been reduced.

Alaska Resources Library and Information Services (ARLIS) – Funding for ARLIS is no longer included in this project (see Project 01550).

NEED FOR THE PROJECT

The project provides the management and administration necessary to efficiently implement the restoration program.

A. Statement of the Problem

Implementation of the restoration program as directed by the Trustee Council and guided by the *Restoration Plan* requires overall scientific management, meaningful public involvement and program administration.

B. Rationale/Link to Restoration

Project 01100 provides essential support to implement the restoration program as directed by the Trustee Council and guided by the *Restoration Plan.*

C. Location

The Trustee Council maintains the Restoration Office in Anchorage (645 G Street, Anchorage, Alaska, 99501).

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

Project 01100 supports various aspects of community involvement. This includes public information efforts to assist the general public and spill community residents in learning about and more effectively participating in the restoration program process. The FY 01 budget also reflects support for some costs (rent, phone-fax, copying) associated with the work of the Community Involvement Coordinator (see Project /052), who works out of the Restoration Office.

PROJECT DESIGN

A. Objectives

The fundamental objective of the Public Information, Science Management and Administration project is to implement a comprehensive, balanced restoration program consistent with the *Restoration Plan* and Trustee Council actions.

Specific objectives for FY 01 include:

1. Implement the authorized FY 01 Work Plan.

2. Compile, manage, synthesize, and disseminate information about the restoration program, including: (1) production of the Restoration Update newsletter; (2) publication of the Restoration Notebook series that profiles the restoration program knowledge regarding specific injured resources, (3) publication of the Annual Status Report, and (4) maintenance of the Trustee Council's web page.

3. Oversee and manage the science program, including the peer review and project evaluation process, under the direction of the Chief Scientist and the Science Coordinator.

5. Develop the Gulf Ecosystem Monitoring Plan (GEM) and monitor and assist in the National Research Council (NRC) review process.

5. Sponsor the Annual Restoration Workshop, bringing together scientists, agency staff, Trustee Council staff, academia, and members of the general public. The theme in FY 01 will be development of the GEM research and monitoring plan.

6. Continue habitat evaluations, appraisals and negotiations with willing sellers under both the Large Parcel and Small Parcel Habitat Protection Programs as applicable. Develop recommendations on the future of these programs, as directed by the Trustee Council in their resolution on the Restoration Reserve.

7. Conduct regular meetings of the Public Advisory Group (PAG) as a means of obtaining public input into the Trustee Council process.

8. Work with the Community Involvement Coordinator and Community Facilitators to inform and involve spill area residents about restoration program activities and findings.

9. Develop the FY 02 Work Plan, including publication of the initial Invitation to Submit Restoration Proposals and preparation of a Draft Work Plan for public comment.

10. Oversee and manage current and prior years' projects funded by the Trustee Council, including the production of quarterly and annual reports.

11. Complete a seventh independent audit.

12. Track equipment purchased with settlement funds.

B. Methods

All Trustee Council operations are governed by the state and federal laws and regulations that apply to the respective agencies that comprise the Trustee Council.

C. Cooperating Agencies, Contracts and Other Agency Assistance

Multiple agencies are involved in the implementation of Project 01100. The Alaska Department of Fish and Game is the administering agency for most of the operations functions. In addition, the Alaska Department of Natural Resources administers the contract for the Chief Scientist/peer review process. The U.S. Department of the Interior receives a small amount of funding for their Federal Budget Office, as well as funding for participation of a federal officer associated with the Public Advisory. All Trustee agencies receive funding for liaison support.

A variety of contracts will be administered under Project 01100, including the Chief Scientist/peer review contract and the annual external audit. A number of small contracts will also be administered under Project 01100 for support services such as equipment maintenance and publication of documents.

SCHEDULE

A. Measurable Project Tasks for FY 01 (October 1, 2000 - September 30, 2001)

Measurable project tasks include holding the Annual Workshop and successful development of the FY 02 Work Plan (including publication of the initial Invitation,

followed by a Draft Work Plan for public comment and then a Final Work Plan following Trustee Council action). Other measurable tasks include meetings of the Trustee Council and the Public Advisory Group, preparation of quarterly financial reports and quarterly project status reports, preparation of habitat program status reports, completion of a seventh independent audit, and publication of the Restoration Update newsletter and the annual restoration program status report.

B. Milestones and Endpoints

Project Authorization Consistent with Trustee Council action:	October-September
Annual Restoration Workshop:	October
Final Trustee Council action on the FY 01 Work Plan:	December
Publish FY 01 Final Work Plan:	December
Publish Newsletter:	December
Complete FY 01 Audit:	January
Publish FY 02 Invitation:	February
Publish Newsletter:	March
Receive FY 02 Project Proposals:	April
Scientific/Technical/Policy/Legal Review of Proposals:	April-August
Publish FY 02 Draft Work Plan:	June
Publish Newsletter:	June
Trustee Council action on FY 02 Work Plan:	August
Executive Director authorizations to proceed on work plan:	August-September
Publish Newsletter:	September

C. Completion Date

Project /100 will continue throughout the life of the restoration program.

PUBLICATIONS AND REPORTS

See above (Measurable Project Tasks).

NORMAL AGENCY MANAGEMENT

Funding under Project 01100 supports the science management, public involvement, and administrative functions that are required to implement the *Restoration Plan*. The functions included in the Project 01100 budget are for the sole purpose of supporting restoration program activities and may not be used for other agency purposes.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

At the direction of the Trustee Council, the Executive Director implements Project 01100 to provide overall coordination and integration of the restoration program. As part of the adaptive management process, the Trustee Council sponsors the annual restoration workshop that brings together scientists, federal and state resource agency representatives, and members of the public to review the status of restoration. In addition, all project proposals are peer reviewed with regard to their coordination and integration aspects. Other coordination efforts include working with the agency liaisons and/or project managers to implement the restoration program.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

The most significant change between FY 00 and FY 01 is continued reduction in funding in parallel with the overall work plan, including the deletion of several positions in the Anchorage Restoration Office and the closure of the Juneau office.

PROPOSED PRINCIPAL INVESTIGATOR, IF KNOWN

Not applicable to this project.

Approved 8-3-00

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	PROPOSED FFY 2001TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
			$21.6	$1,063.9	$331.6	$19.5	$40.5	$23.0
Personnel	$935.1	$622.2						
Travel	$89.0	$69.2						
Contractual	$796.1	$658.4						
Commodities	$24.5	$15.3						
Equipment	$4.8	$3.4	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$1,849.5	$1,368.5		Estimated FFY 2002				
General Administration	$184.4	$131.5						
Project Total	$2,033.9	$1,500.0		TBD				
Full-time Equivalents (FTE)	12.3	9.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

This budget reflects further reduction of expenses associated with administration of the restoration program .

Changes included in this budget includes:
* eliminates funds for ARLIS (will be funded through Project /550 beginning in FY01);
* eliminates funding for the Director of Administration, Administrative Manager and Communications Coordinator;
* closes the Juneau Restoration Office;
* reduces the Chief Scientist's contract by $50.0;
* reduces the liaisons from 4 months to 2 months;
* establishes a Special Assistant (emphasis will be administration and finance, with special projects as assigned);
* moves personnel funds to contractual for communications support.

PREPARED 7/24/00

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration
Agency: Multiple

FORM 2A
MULTI-TRUSTEE AGENCY SUMMARY

DRAFT

Prepared: 7/25/00

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	PROPOSED FFY 2001 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
			$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Personnel	$71.3	$0.0						
Travel	$0.0	$0.0						
Contractual	$45.0	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$116.3	$0.0		Estimated FFY 2002				
General Administration	$13.8	$0.0						
Project Total	$130.1	$0.0						
Full-time Equivalents (FTE)	1.0	1.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

In FY 2001, funding for ARLIS will be considered part of the Fiscal Year 2001 Work Plan.

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: Multiple

SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FFY 2002				
Personnel	$71.3	$0.0						
Travel	$0.0	$0.0						
Contractual	$0.0	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$71.3	$0.0						
General Administration	$10.7	$0.0						
Project Total	$82.0	$0.0						
Full-time Equivalents (FTE)	1.0	1.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: AK Dept. of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
Holba	Librarian III	19F	12.0	5.9		
	Subtotal		12.0	5.9	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
				Travel Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: AK Dept. of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed
Description	FFY 2001
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0
Commodities Costs:	Proposed
Description	FFY 2001
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: AK Dept. of Fish and Game

FORM 3B
Contractual & Commodities DETAIL

DRAFT

Prepared: 7/25/00

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: AK Dept. of Fish and Game

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FFY 2002				
Personnel	$0.0	$0.0						
Travel	$0.0	$0.0						
Contractual	$45.0	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$45.0	$0.0						
General Administration	$3.2	$0.0						
Project Total	$48.2	$0.0						
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: Dept. of the Interior

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

Prepared: 7/25/00

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
	Subtotal		0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
				Travel Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: Dept. of the Interior

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Contractual Costs:	Proposed FFY 2001
Description	
Building Lease (contribution to ARLIS) Subscriptions, acquisitions, other expenses (contribution to ARLIS)	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: Dept. of the Interior

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - ARLIS
Agency: Dept. of the Interior

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FFY 2002				
Personnel	$0.0	$0.0						
Travel	$0.0	$0.0						
Contractual	$343.7	$293.7						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$343.7	$293.7						
General Administration	$19.4	$18.4						
Project Total	$363.1	$312.1		TBD				
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

In FFY 01, funding for the Chief Scientist peer review contract is reduced by $50.0 from FFY 00.

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Chief Scientist and Peer Reviewers
Agency: AK Dept. of Natural Resources

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 2001
Name	Position Description					
	Subtotal		0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 2001
Description					
				Travel Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Chief Scientist and Peer Reviewers
Agency: AK Dept. of Natural Resources

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FFY 2001
Description	
Contract to provide scientific support to the Trustee Council, including the services of the Chief Scientist and for Peer Reviews. A contract is currently in place with annual options for renewal. The contractor is paid monthly based upon services rendered monthly, throughout the entire fiscal year.	293.7
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$293.7

Commodities Costs:	Proposed FFY 2001
Description	
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Chief Scientist and Peer Reviewers
Agency: AK Dept. of Natural Resources

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Chief Scientist and Peer Reviewers
Agency: AK Dept. of Natural Resources

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	PROPOSED FFY 2001 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
				$1,030.8			$20.0	$0.0
Personnel	$685.4	$529.8						
Travel	$33.2	$38.4						
Contractual	$400.3	$364.7						
Commodities	$15.5	$15.3						
Equipment	$4.8	$3.4	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$1,139.2	$951.6		Estimated				
General Administration	$123.9	$99.3		FFY 2002				
Project Total	$1,263.1	$1,050.8		TBD				
Full-time Equivalents (FTE)	9.2	7.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Administration, Public Information and Scientific Management - Restoration Office
Agency: Multiple

SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	[redacted]					
Personnel	$668.0	$512.4						
Travel	$33.2	$38.4						
Contractual	$388.3	$364.7						
Commodities	$15.5	$15.3						
Equipment	$4.8	$3.4	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$1,109.8	$934.2		Estimated FFY 2002				
General Administration	$120.5	$96.7						
Project Total	$1,230.3	$1,030.8		TBD				
			[redacted]					
Full-time Equivalents (FTE)	9.0	7.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

Staffing changes proposed for FFY 01 include elimination of the Director of Administration, Administrative Manager and Communications Coordinator and the establishment of a Special Assistant .

The Administrative Assistant II (P. Banks) position is funded through ADF&G General Administration funds.

May consider using contractual funds allocated for Local Area Network/Web Server Support and Communications Support to hire an individual on staff for computer support, web support and desk top publishing.

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: AK. Dept. of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
McCammon	Executive Director		12.0	11.2		134.4
FUNDING ELIMINATED	Director of Administration					0.0
Hennigh	Special Assistant		12.0	5.9		70.8
Mundy	Science Coordinator		12.0	9.3		111.6
FUNDING ELIMINATED	Director of Operations					0.0
Schubert	Director of Restoration		12.0	8.4		100.8
FUNDING ELIMINATED	Communciations Coordinator					0.0
FUNDING ELIMINATED	Administrative Manager					0.0
Banks	Administrative Assistant II *		12.0	3.8		1.2
Womac	Administrative Assistant II		12.0	4.6		55.2
ELIMINATED	Microcomputer Technician II					0.0
Hall	Administrative Clerk		12.0	3.2		38.4
Overtime					0.0	0.0
* Note: A portion of this position supported with GA funds.	Subtotal		84.0	46.4	0.0	
					Personnel Total	$512.4

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
In-State Travel					
Anchorage to Juneau (2 staff/1 transcriber for 3 TC meeting)	0.4	9	9	0.2	5.4
Anchorage to Juneau (administrative travel)	0.4	10	20	0.2	8.0
Annual Workshop Travel (for invited speakers)					5.0
Other community involvement/public meetings	0.2	6	12	0.2	3.6
Car rental (daily rate of $40.00)			14		0.6
Out-of-State Travel					
Anchorage - Washington D.C.	1.0	6	15	0.2	9.0
National scientific meetings	1.0	4	14	0.2	6.8
				Travel Total	$38.4

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: AK. Dept. of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Contractual Costs:	Proposed
Description	FFY 2001
2000 Audit Engagement	55.0
Phone and fax	28.0
Postage (metered mail 10.0, bulk mail 6.0)	16.0
Courier service	3.5
Building Lease/Parking - 645 G Street	89.2
Annual Restoration Status Report	10.0
Newsletter (4 issues: printing at $1,700 each)	6.8
Annual Invitation	5.5
Final Work Plan	1.2
Draft Work Plan	2.5
Restoration Notebook Series (4 editions with 400 copies each)	1.2
Equipment Maintenance Agreements (copiers, fax machines, postage meter in Anchorage and Juneau)	11.8
Local Area Network/Web Server support contract (out source)	40.0
Public Notice (TC meetings, annual Invitation and other meetings)	3.0
ADA Compliance (special access to meetings)	1.0
Transcription Services	5.0
Teleconferencing	8.0
Staff training	3.0
Aircraft Charters within the Spill Area	2.0
Annual Restoration Workshop	20.0
Other technical review sessions/workshops	4.0
Other printing and publications	4.0
Meeting space rental (out of building)	1.0
56KB Line /DIS-WAN Access (ATU connect charges/dail-up 0.9, WAN/e-mail 4.2)	8.0
Investment Working Group Costs	5.0
Communications Support	30.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$364.7

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoriation Office
Agency: AK Dept. of Fish and Game

FORM 3B
Contractual & Commodities
DETAIL

DRAFT

Commodities Costs:	Proposed FFY 2001
Description	
Office Supplies	11.0
Local Area Network Software and Upgrades	2.3
Data Processing Supplies	2.0
Commodities Total	$15.3

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: AK. Dept. of Fish and Game

FORM 3B
Contractual & Commodities
DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
Replacement Computers	2	1.2	2.4
Office Equipment			1.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$3.4

Existing Equipment Usage: Description	Number of Units	Inventory Agency

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: AK. Dept. of Fish and Game

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FFY 2002				
Personnel	$17.4	$17.4						
Travel	$0.0	$0.0						
Contractual	$0.0	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$17.4	$17.4						
General Administration	$2.6	$2.6						
Project Total	$20.0	$20.0						
Full-time Equivalents (FTE)	0.2	0.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: Dept. of the Interior

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
Baldauf	Federal Budget Officer		2.0	8.7		17.4
	Subtotal		2.0	8.7		
					Personnel Total	$17.4

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
				Travel Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: Dept. of the Interior

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: Dept. of the Interior

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: Dept. of the Interior

FORM 3B
Equipment
DETAIL

FFY 01 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET
October 1, 2000 · , ember 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel	$0.0	$0.0
Travel	$0.0	$0.0
Contractual	$12.0	$0.0
Commodities	$0.0	$0.0
Equipment	$0.0	$0.0
Subtotal	$12.0	$0.0
General Administration	$0.8	$0.0
Project Total	$12.8	$0.0
Full-time Equivalents (FTE)	0.0	0.0
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

	Estimated FFY 2002				

Dollar amounts are shown in thousands of dollars.

Comments:

Represents closure of the Juneau Office.

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: National Oceanic & Atmospheric Administration

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
	Subtotal		0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
				Travel Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: National Oceanic & Atmospheric Administration

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Contractual Costs:	Proposed FFY 2001
Description	
Juneau Federal Building - Office Closed	0.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: National Oceanic & Atmospheric Administration

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Restoration Office
Agency: National Oceanic & Atmospheric Administration

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	PROPOSED FFY 2001 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
				$13.8			$3.5	
Personnel	$6.0	$3.0						
Travel	$13.8	$13.8						
Contractual	$7.1	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$26.9	$16.8		Estimated				
General Administration	$1.4	$0.5		FFY 2002				
Project Total	$28.3	$17.3		TBD				
Full-time Equivalents (FTE)	0.1	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: Multiple

SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FFY 2002				
Personnel	$0.0	$0.0		TBD				
Travel	$13.8	$13.8						
Contractual	$7.1	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$20.9	$13.8						
General Administration	$0.5	$0.0						
Project Total	$21.4	$13.8						
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

Budget based on 4 meetings of the Public Advisory Group (two meetings in person and two by teleconference). PAG phone costs, printing and copying are partly a shared expense in the Operations component.

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: AK Dept. of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
						0.0
	Subtotal		0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
Member travel from various locations					
Regular meetings (1 one day meeting/1 two day meeting)					10.8
Other meetings/reviews (e.g., Restoration Workshop)					3.0
Note: In person meeting cost is approximately $4,900 per meeting for travel and per diem expenses. For a 2 day meeting, add $1,000 in per diem costs. Teleconference meetings cost approximately $600 per meeting.						
					Travel Total	$13.8

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: AK Dept. of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed
Description	FFY 2001
Postage and courier	0.0
Teleconferncing (2 meetings)	0.0
Public Notice/Announcements for PAG meetings	0.0
ADA Compliance	0.0
Other meeting costs	0.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed
Description	FFY 2001
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: AK Dept. of Fish and Game

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: AK Dept. of Fish and Game

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel	$6.0	$3.0
Travel	$0.0	$0.0
Contractual	$0.0	$0.0
Commodities	$0.0	$0.0
Equipment	$0.0	$0.0
Subtotal	$6.0	$3.0
General Administration	$0.9	$0.5
Project Total	$6.9	$3.5
Full-time Equivalents (FTE)	0.1	0.0
Other Resources		

LONG RANGE FUNDING REQUIREMENTS					
	Estimated FFY 2002				
	TBD				

Dollar amounts are shown in thousands of dollars.

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: Dept. of the Interior

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
Mutter	Regional Environmental Assistant		0.5	6.0		3.0
	Subtotal		0.5	6.0	0.0	
					Personnel Total	$3.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
				Travel Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: Dept. of the Interior

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Prepared: 7/25/00

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: Dept. of the Interior

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Public Advisory Group
Agency: Dept. of the Interior

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	PROPOSED FFY 2001 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
			$21.6	$19.1	$19.5	$19.5	$17.0	$23.1
Personnel	$172.4	$89.4						
Travel	$42.0	$17.0						
Contractual	$0.0	$0.0						
Commodities	$9.0	$0.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$223.4	$106.4		Estimated FFY 2002				
General Administration	$25.9	$13.4						
Project Total	$249.3	$119.8		TBD				
Full-time Equivalents (FTE)	2.0	1.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

FFY 01 budget reflects 0.2 FTE (2 months) funding for each agency liaison.

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support

SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FFY 2002				
Personnel	$32.4	$16.6						
Travel	$6.0	$2.5						
Contractual	$0.0	$0.0						
Commodities	$1.5	$0.0						
Equipment	$0.0	$0.0		TBD				
Subtotal	$39.9	$19.1						
General Administration	$4.9	$2.5						
Project Total	$44.8	$21.6						
Full-time Equivalents (FTE)	0.3	0.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Environmental Conservation

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

Prepared: 7/25/00

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
See	Agency Liaison		2.0	8.3		16.6
	Subtotal		2.0	8.3	0.0	
					Personnel Total	$16.6

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
Trustee Travel					0.0
Liaison Travel					0.0
Agency Travel					2.5
				Travel Total	$2.5

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Environmental Conservation

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Prepared: 7/25/00

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Office supplies/other liaison costs	0.0
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Environmental Conservation

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases:	Number of Units	Unit Price	Proposed FFY 2001
Description			
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	Inventory Agency
Description		

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Environmental Conservation

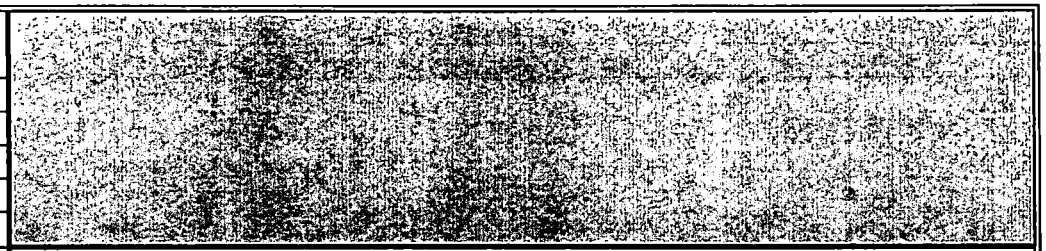
FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel	$26.8	$13.6
Travel	$8.0	$3.5
Contractual	$0.0	$0.0
Commodities	$1.5	$0.0
Equipment	$0.0	$0.0
Subtotal	$36.3	$17.1
General Administration	$4.0	$2.0
Project Total	$40.3	$19.1
Full-time Equivalents (FTE)	0.3	0.2
Other Resources		



LONG RANGE FUNDING REQUIREMENTS					
	Estimated FFY 2002				
	TBD				

Dollar amounts are shown in thousands of dollars.

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

Prepared: 7/25/00

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 2001
Name	Position Description					
Slater	Agency Liaison		2.0	6.8		13.6
	Subtotal		2.0	6.8	0.0	
					Personnel Total	$13.6

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 2001
Description					
Trustee Travel					0.0
Liaison travel					0.0
Agency Travel					3.5
				Travel Total	$3.5

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Prepared: 7/25/00

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Office supplies/other liaison costs	0.0
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Fish and Game

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
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

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Fish and Game

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUST OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel	$29.6	$14.8
Travel	$6.0	$2.5
Contractual	$0.0	$0.0
Commodities	$1.5	$0.0
Equipment	$0.0	$0.0
Subtotal	$37.1	$17.3
General Administration	$4.4	$2.2
Project Total	$41.5	$19.5
Full-time Equivalents (FTE)	0.3	0.2
Other Resources		

LONG RANGE FUNDING REQUIREMENTS					
	Estimated FFY 2002				
	TBD				

Dollar amounts are shown in thousands of dollars.

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Natural Resources

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUST COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
Fries	Agency Liaison		2.0	7.4		14.8
	Subtotal		2.0	7.4	0.0	
					Personnel Total	$14.8

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
Liaison travel					0.0
Trustee Travel					0.0
Agency Travel					2.5
				Travel Total	$2.5

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Natural Resources

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Prepared: 7/25/00

FFY 01 EXXON VALDEZ TRUST COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Office supplies/other liaison costs	0.0
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Natural Resources

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases:	Number of Units	Unit Price	Proposed FFY 2001
Description			
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	Inventory Agency
Description		

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: AK Dept. of Natural Resources

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
Personnel	$26.0	$14.8						
Travel	$6.0	$2.5						
Contractual	$0.0	$0.0						
Commodities	$1.5	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$33.5	$17.3		Estimated FFY 2002				
General Administration	$3.9	$2.2						
Project Total	$37.4	$19.5		TBD				
Full-time Equivalents (FTE)	0.3	0.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: Dept. of Agriculture, Forest Service

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

Prepared: 7/25/00

FFY 01 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
Holbrook	Agency Liaison		2.0	7.4		14.8
	Subtotal		2.0	7.4	0.0	
					Personnel Total	$14.8

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
Trustee Travel					0.0
Liaison Travel					0.0
Agnecy Travel					2.5
				Travel Total	$2.5

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison
Agency: Dept. of Agriculture, Forest Service

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Office supplies/other liaison costs	0.0
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: Dept. of Agriculture, Forest Service

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases:	Number of Units	Unit Price	Proposed FFY 2001
Description			
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	Inventory Agency
Description		

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: Dept. of Agriculture, Forest Service

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel	$24.0	$12.6
Travel	$6.0	$2.5
Contractual	$0.0	$0.0
Commodities	$1.5	$0.0
Equipment	$0.0	$0.0
Subtotal	$31.5	$15.1
General Administration	$3.6	$1.9
Project Total	$35.1	$17.0
Full-time Equivalents (FTE)	0.3	0.2
Other Resources		

LONG RANGE FUNDING REQUIREMENTS					
	Estimated FFY 2002				

Dollar amounts are shown in thousands of dollars.

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: Dept. of the Interior

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 2001
Name	Position Description					
TBD	Liaison		2.0	6.3		12.6
	Subtotal		2.0	6.3	0.0	
					Personnel Total	$12.6

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 2001
Description					
Trustee Travel					0.0
Liaison Travel					0.0
Agency Travel					2.5
				Travel Total	$2.5

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: Dept. of the Interior

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Office supplies/other liaison costs	0.0
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: Dept. of the Interior

FORM 3B
Contractual & Commodities
DETAIL

DRAFT

New Equipment Purchases:	Number of Units	Unit Price	Proposed FFY 2001
Description			
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	Inventory Agency
Description		

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: Dept. of the Interior

FORM 3B
Equipment
DETAIL

DRAFT

FFY 01 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
				Estimated FFY 2002				
Personnel	$33.6	$17.0						
Travel	$10.0	$3.5						
Contractual	$0.0	$0.0						
Commodities	$1.5	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$45.1	$20.5						
General Administration	$5.0	$2.6						
Project Total	$50.1	$23.1						
Full-time Equivalents (FTE)	0.3	0.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: National Oceanic & Atmospheric Administration

FORM 3A
TRUSTEE
AGENCY
SUMMARY

DRAFT

FFY 01 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
Wright	Agency Liaison		2.0	8.5		17.0
	Subtotal		2.0	8.5	0.0	
					Personnel Total	$17.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
Trustee Travel					0.0
Liaison Travel					0.0
Agency Travel					3.5
				Travel Total	$3.5

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: National Oceanic & Atmospheric Administration

FORM 3B
Personnel
& Travel
DETAIL

DRAFT

Prepared: 7/25/00

Contractual Costs:	Proposed FFY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FFY 2001
Description	
Office supplies/other liaison costs	0.0
Commodities Total	$0.0

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: National Oceanic & Atmospheric Administration

FORM 3B
Contractual & Commodities DETAIL

DRAFT

New Equipment Purchases:		Number	Unit	Proposed
	Description	of Units	Price	FFY 2001
Those purchases associated with replacement equipment should be indicated by placement of an R.			**New Equipment Total**	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

2001

Project Number: 01100
Project Title: Public Information, Science Management and Administration - Liaison Support
Agency: National Oceanic & Atmospheric Administration

FORM 3B
Equipment
DETAIL

DRAFT

01126

approved TC 8-3-00

Habitat Protection and Acquisition Support

Project Number:	01126
Restoration Category:	Habitat Protection
Proposer:	AK Dept. Of Natural Resources
Lead Trustee Agency:	ADNR
Cooperating Agencies:	ADF&G, USFS, DOI
Duration:	Ongoing
Cost FY 01:	$262.6
Cost FY 02:	To be determined
Geographic Area:	All
Injured Resource/Service:	Multiple resources

ABSTRACT

This project provides support to the Trustee Council in order to reach closure on habitat protection priorities. This support includes title reports, appraisals, on site inspections, hazardous materials surveys, timber cruises and reviews, and other services necessary for the successful completion of habitat protection negotiations.

INTRODUCTION

The Trustee Council funds the acquisition of land, or interests in land, in order to protect the habitat of injured resources. The goals of habitat protection are to prevent additional injury to resources and services while recovery is taking place and to provide a long-term safety net for these resources. For example, restoration efforts in the Pacific Northwest have taught us that habitat protection is essential to the health of salmon species. Researchers have concluded that depleted salmon populations cannot rebuild if habitat that is critical during any of their life stages is seriously compromised. This lesson extends as well to the other fish, birds, and mammals injured by the oil spill that nest, feed, molt, winter, and seek shelter in the habitat protected through the Council's habitat protection and acquisition program.

This project provides support for the habitat protection activities of the Trustee Council. This support includes title reports, appraisals, on site inspections, hazardous materials surveys, timber cruises and reviews, and other services necessary for the Trustee Council to achieve habitat protection objectives.

The Trustee Council's large parcel program is now essentially complete. As of July 2000, the Trustee Council has committed $343 million to protect 635,770 acres of land in large parcels , as follows. Interests in the lands protected by the Council range from acquisition of fee simple title to various forms of conservation easements as follows:

- 23,800 acres within Kachemak Bay State Park, including a highly productive estuary and several miles of anadromous fish streams and intertidal shoreline, from private inholders;
- 32,537 acres within the Kenai Fjords National Park and on adjacent islands within the Alaska Maritime National Wildlife Refuge, including valuable coastal habitat, from English Bay Corporation;
- 26,665 acres of prime habitat on Shuyak Island, at the northern tip of the Kodiak archipelago, from the Kodiak Island Borough;
- 41,549 acres of mature spruce forest and highly productive coastal habitat in the Kodiak archipelago, in what has now become Afognak Island State Park, from the Seal Bay Timber Company;
- 41,750 acres of land and conservation easements on northern Afognak Island, including buffers around Paul's and Laura lakes and some of the most highly ranked habitat in terms of restoration value in the spill region, from Afognak Joint Venture;
- 59,674 acres of prime habitat for salmon, bald eagles, bears, and other species in the Kodiak National Wildlife Refuge from Koniag, Inc.; negotiations continue with Koniag, Inc. to extend the current conservation easement (due to expire December 2001) on 55,402 additional acres of habitat along the Karluk and Sturgeon rivers;
- 115,973 acres within the Kodiak National Wildlife Refuge from Akhiok-Kaguyak, Inc.;
- 31,609 acres of land and conservation easements within the Kodiak National Wildlife Refuge from Old Harbor Native Corporation;

- 59,520 acres of land and conservation easements in Prince William Sound, including parcels at Eshamy Bay and Jackpot Bay, which have some of the highest restoration values in the spill area, from Chenega Corporation;
- 77,477 acres of land, conservation easements, and timber easements, including Port Gravina, Sheep Bay, and Windy Bay, which are considered among the most valuable parcels in Prince William Sound for recovery of species injured by the spill, from Eyak Corporation; and
- 69,814 acres of land and conservation easements, including Bligh Island and Two Moon Bay, which were the third and fourth highest ranked parcels in terms of restoration value in Prince William Sound, from Tatitlek Corporation.

In total, approximately 1,419 miles of coastline and 305 anadromous rivers, streams, and spawning areas have been protected.

The Trustee Council has also spent $19.9 million to acquire 7,502 acres of habitat in small parcels (generally under 1,000 acres each), and authorized $1 million to purchase an additional 533 acres in small parcels. The Council is considering acquisition of at least 1,406 more acres (the Council has authorized going forward with appraisals, but has not authorized funding to purchase these parcels). Small parcels are typically located on coves, along important stretches of river, at the mouths of rivers, or adjacent to valuable tidelands, and are often close to spill area communities. These lands are acquired for their habitat qualities as well as their importance for subsistence and recreational use.

In March 1999 the Trustee Council designated $55 million of Restoration Reserve funds for a long-term habitat protection program, to begin in October 2002. Although a decision on just what that program will look like has not yet been made, in FY 00 the Trustee Council has directed staff to explore a grant with a non-profit organization to administer a future small parcel program.

A complete listing of the large and small parcels protected by the Trustee Council, including those small parcels still under negotiation/consideration, can be found in the Restoration Office's "Habitat Protection Program: Status Report."

NEED FOR THE PROJECT

The Trustee Council funds the acquisition of land, or interests in land, in order to protect the habitat of injured resources. The goals of habitat protection are to prevent additional injury to resources and services while recovery is taking place and to provide a long-term safety net for these resources. For example, restoration efforts in the Pacific Northwest have taught us that habitat protection is essential to the health of salmon species. Researchers have concluded that depleted salmon populations cannot rebuild if habitat that is critical during any of their life stages is seriously compromised. This lesson extends as well to the other fish, birds, and mammals injured by the oil spill that nest, feed, molt, winter, and seek shelter in the habitat protected

through the Council's habitat protection and acquisition program. Nineteen resources and services injured by the spill are linked to protection of upland and nearshore habitats.

Active negotiations and closing activities with landowners are currently taking place and anticipated to continue at least through FY 01.

COMMUNITY INVOLVEMENT

The public has reviewed and commented on the Trustee Council's habitat protection program and has been highly supportive of habitat protection as a major restoration strategy into the future. All reports published as part of the Council's habitat protection process have been reviewed by the public. Input from natural resource and services specialists in the public sector was collected in a workshop conducted by The Nature Conservancy.

Members of local communities have previously had the opportunity to review habitat protection evaluation and ranking results and Trustee Council priorities. The Council continues to be receptive and responsive to pubic comment pertinent to habitat protection priorities and acquisitions. The Council's Public Advisory Group is briefed and the public is given the opportunity to comment prior to any Council action.

PROJECT DESIGN

A. Objectives

Habitat protection and acquisition are designed to protect lands linked to resources and services that were injured by the *Exxon Valdez oil spill.* Protection of these lands prevents additional injury to living resources and habitats, services and natural support systems while recovery is taking place. Habitat protection addresses cases where existing regulations affecting private land use may be inadequate to protect essential habitats of recovering resources and services. In situations where natural recovery is slow to occur or where direct restoration is neither technically feasible or cost effective, other measures need to be considered to mitigate injury. These may include replacement of injured resources and services with those that are equivalent. Replacement or acquisition of the equivalent means compensation for an injured, lost or destroyed resource by substituting another resource that provides the same or substantially similar services as the injured resource (56 Federal Register 8899 [March 1, 1991]).

The affected injured resources and associated services are listed below. Although habitat protection objectives and benefits for each of these resources and services differ depending on the particular parcel and the options acquired general objectives and benefits are outlined below.

• Pink salmon, sockeye salmon, cutthroat trout, Dolly varden, herring: ensure maintenance of adequate water quality, riparian habitat and intertidal habitat for spawning and rearing.

• Bald eagle: ensure maintenance of adequate nesting habitat and reduce disturbance in feeding and roosting areas.

• Black oystercatcher: reduce disturbance to feeding and nesting sites.

• Common murre: reduce disturbance in nearshore feeding areas and near nesting colonies.

• Harbor seal and sea otters: reduce disturbance at haulout sites, pupping sites, and in nearshore feeding areas.

• Harlequin duck: ensure maintenance of adequate riparian habitat for nesting and brood rearing, and reduce disturbance to nearshore feeding, molting, and broodrearing habitats.

• Intertidal/subtidal biota: maintain water quality along shoreline and reduce disturbance in nearshore areas.

• Marbled murrelet: ensure maintenance of adequate nesting, habitat and reduce disturbance to nearshore feeding and broodrearing habitats.

• River otter: ensure maintenance of adequate riparian and shoreline habitats for feeding and denning.

• Recreation: Maintain or enhance public access for recreational opportunities, reduce disturbances that would create visual impacts.

• Wilderness: Maintain wilderness qualities, reduce impacts to wilderness qualities.

• Cultural resources: Maintain or reduce disturbance to cultural resource sites.

• Subsistence: Ensure subsistence opportunities in known harvest areas.

B. Methods:

Habitat protection tools that will be considered for use by the Trustee Council include fee acquisition, conservation easements, acquisition of partial interests, cooperative management agreements, and others. Acquisition of lands or interest in lands are accomplished according to accepted realty principles and practices. All acquisitions require title evidence, appraisals of fair market value, litigation reports, hazardous substances surveys, legal review of title, and negotiations. Following purchase, acquired parcels are managed by the appropriate resource

agency in a manner that is consistent with the restoration of the affected resources and/or services.

In FY 01, work is expected on the following large parcels:

ADNR

- Old Harbor land exchange - Conduct public process; review appraisal, title, and closing documents
- Koniag Phase II - Review title and closing documents
- Karluk Village Council - Complete appraisal review, if not completed in FY 00

ADF&G

- Review large parcel acquisitions to ensure that State interests are protected relative to Alaska National Interest Land Conservation Act (ANILCA) and Alaska Native Claims Settlement Act (ANCSA) access provisions

USFWS/DOI

- Koniag Phase II - Continue work to extend conservation easement
- Akhiok-Kaguyak V- Conduct closing for final 75 acres (review deeds, prepare conveyance documents, prepare request for preliminary title opinion, order updated commitments for title insurance)

Work is expected on the following small parcels in FY 01:

USFWS/DOI

KAP 281 Shugak / 3 Saints Bay, KNWR
KAP 283 Metrokin / Chiniak Bay, AMNWR
KAP 285 Carlson / Hook Bay, APNWR
TC authorized going forward with appraisals 7/5/00.

51 Kodiak Tax (KIB) / Larsen Bay Shareholder (LBS) Parcels

TC made offers on the following 7/5/00; * indicates purchase agreement has been signed as of 7/26/00:

KAP 1089	LBS / R. Christensen
KAP 1094	LBS / Conservation Fund *
KAP 1098	LBS / Conservation Fund *
KAP 2000	LBS / Conservation Fund *
KAP 2003	LBS / Conservation Fund *
KAP 2006	LBS / Conservation Fund *
KAP 2008	KIB / Zachar Bay
KAP 2009	KIB / Zachar Bay
KAP 2010	KIB / Zachar Bay
KAP 2011	KIB / Amook Pass
KAP 2012	KIB / Browns Lagoon
KAP 2013	KIB / Amook Pass

KAP 2014	KIB / Amook Pass
KAP 2015	KIB / Amook Pass
KAP 2016	KIB / South Uyak Bay
KAP 2017	KIB / South Uyak Bay
KAP 2019	LBS / R. Christensen
KAP 2020	LBS / B. Aga
KAP 2022	LBS / F. Stager
KAP 2035	LBS / S. Kaneshiro
KAP 2036	LBS / J. Penkusky
KAP 2037	LBS / L. Smith
KAP 2038	LBS / G. Johnson
KAP 2039	LBS / R. Penwarden
KAP 2040	LBS / P. Abston
KAP 2041	LBS / D. Lorance
KAP 2042	LBS / D. Abston
KAP 2043	LBS / R. Jager
KAP 2044	LBS / J. Antonsen
KAP 2045	LBS / J. Antonsen
KAP 2046	LBS / V. Abston
KAP 2047	LBS / Becker, et al
KAP 2048	KIB / Uyak Bay
KAP 2049	KIB / Uyak Bay
KAP 2050	KIB / Uyak Bay
KAP 2051	KIB / Uyak Bay
KAP 2052	KIB / Carlsen Point
KAP 2053	KIB / Carlsen Point
KAP 2054	KIB / Carlsen Point
KAP 2055	KIB / Zachar Bay
KAP 2056	KIB / Larsen Bay
KAP 2057	KIB / Larsen Bay
KAP 2058	KIB / Larsen Bay
KAP 2059	KIB / Larsen Bay
KAP 2060	LBS / F. Glenn
KAP 2061	LBS / P. Danilesky
KAP 2062	LBS / D. Johnson
KAP 2063	LBS / J. Johnson
KAP 2064	LBS / N. Johnson
KAP 2065	LBS / P. Hester
KAP 2066	LBS / J. Johnson

USFS

PWS 1028 / one Valdez Duck Flats parcel

TC made an offer on this parcel 7/5/00.

Tatitlek Homesites
TC made offers on the following 7/5/00:
PWS 296 / H. Olsen
PWS 297 / D. Totemoff
PWS 298 / J. Levshakoff
PWS 299 / L. Allen
PWS 300 / E. Barnes
PWS 301 / A. Elie
PWS 302 / L. Olsen
PWS 303 / S. Chernoff
PWS 304 / E. Gregorieff
PWS 305 / C. Totemoff
PWS 306 / D. Wilfer
PWS 307 / J. Totemoff
PWS 308 / P. Totemoff

ADFG

KEN 293 Yager / Anchor River
KEN 294 Eliot / Anchor River
KEN 295 Brookwood / Anchor River
TC authorized going forward with appraisals 7/5/00.

ADNR

KEN 309 Icicle Seafoods / Ninilchik River
KEN 310 Swartzes Enterprises / Ninilchik River
TC authorized going forward with appraisals 7/5/00.

C . Contracts and Other Agency Assistance

Various components of this project will be contracted out to the private sector. Contracting is managed by the agency responsible for acquisition of habitat protection rights and future management. Various agencies handle various realty requirements differently depending upon agency requirements and in house expertise.

SCHEDULE

This project does not lend itself to a specific timetable. Activities associated with this project are subject to influence from landowners, negotiators and various contractors.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

All habitat protection efforts rely in part on the results of ongoing research and monitoring projects. For example, the Large Parcel program used information from the anadromous fish stream catalog, colonial seabird catalog, bald eagle nesting maps, and data from Trustee Council funded studies on black oystercatchers, marbled murrelets and pigeon guillemots.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

There is no substantive change anticipated for FY 01. However, the program will be smaller in FY 01 than it has been in recent years, as most large parcel acquisitions are complete and a relatively small number of small parcel acquisitions are currently in progress. New parcel nominations are not being actively solicited.

ENVIRONMENTAL COMPLIANCE

Previous acquisitions have received a categorical exclusion. The appropriate federal agencies, U.S. Department of the Interior or U.S. Forest Service, will comply with NEPA where appropriate.

PERSONNEL

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Approved TC 8-3-00

FY 01 EXXON VALDEZ TRUSTEE [redacted]NCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 2000	Proposed FY 2001	PROPOSED FY 01 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI/USFWS	DOI/NPS
				$15.8	$111.3	$46.2	$83.1	
Personnel	$159.1	$154.2						
Travel	$36.7	$19.7						
Contractual	$138.9	$53.3						
Commodities	$5.2	$2.3						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$339.9	$229.5				Estimated FY 2002		
General Administration	$33.6	$26.9						
Project Total	$373.5	$256.4						
Full-time Equivalents (FTE)	2.2	2.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources	$0.0	$0.0		$0.0	$0.0	$0.0		

PREPARED: 8/2/00

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Lead Agency: AK Dept. of Natural Resources

FORM 2A
MULTI-TRUSTEE
AGENCY
SUMMARY

8/2/00

Revision 8-1-00

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 00	Proposed FY 01	LONG RANGE FUNDING REQUIREMENTS					
						Estimated FY 2002		
Personnel	$28.4	$59.8						
Travel	$1.2	$3.2						
Contractual	$120.4	$36.5						
Commodities	$0.3	$0.3						
Equipment	$0.0	$0.0						
Subtotal	$50.3	$99.8						
General Administration	$12.7	$11.5						
Project Total	$163.0	$111.3				$80.0		
Full-time Equivalents (FTE)		0.7						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Budget estimates are based on status of negotiations as of 7/17/00. This budget assumes pursuit of 3 Anchor River small parcels (KEN 293, 294, 295) and 2 Ninilchik River parcels (KEN 309, 310).

This budget includes only 10 days of appraisal work for the review appraiser. This will allow the completion of appraisal work associated with the Old Harbor Exchange, Karluk, and other outstanding appraisals up to a maximum of 10 days. After that, appraisal work will not be readily available due to other agency mandates. The Koniag conservation easement, Termination Point/Lesnoi package, and additional closings on Eyak and AJV will occur but are not specifically built into this budget. Ongoing efforts on the Karluk IRA lands are not built into this budget.

This budget does not include any funds for the Habitat Protection Working Group.

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Natural Resources

FORM 3A
TRUSTEE
AGENCY
SUMMARY

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FY 01
	Natural Resource Manager II	20	3.0	7.2		21.6
	Natural Resource Mgr. I (Title Examiner)	18	4.9	7.0		34.3
	Natural Resource Manager II (Appraiser)	20	0.5	7.7		3.9
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		8.4	21.9	0.0	
					Personnel Total	$59.8

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FY 01
					0.0
Travel to Kenai for hazmat survey and site inspections for 5 small parcels (KEN 293, 294, 295, 309, 310).	0.10	5	5	0.13	1.2
					0.0
					0.0
					0.0
Travel to Kodiak for public hearings on Old Harbor land exchange.	0.40	2	6	0.20	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$3.2

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Natural Resources

FORM 3B
Personnel
& Travel
DETAIL

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FY 01
Description	
Map production and data analysis support for negotiators, appraisers, land status verification, data management support.	7.0
Travel and negotiation support expenses for Dept. of Law	2.0
Document production and printing costs	1.0
Small Parcel Title Insurance (KEN 293, 294, 295, 309, 310)	10.0
Hazardous Materials Review (KEN 293, 294, 295, 309, 310)	1.5
Old Harbor Exchange (previously outlined in 98126 supplemental)	12.0
Appraisal reviews, as needed (possibly 5 state parcels, 3 federal parcels)	3.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$36.5

Commodities Costs:	Proposed FY 01
Description	
Office and field supplies (toner cartridges, data cassettes, etc.)	0.3
Commodities Total	$0.3

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Natural Resources

FORM 3B
Contractual & Commodities DETAIL

Prepared: 8/1/00

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 01
			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 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Natural Resources

FORM 3B
Equipment
DETAIL

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 00	Proposed FY 01
Personnel	$68.9	$32.0
Travel	$15.8	$3.3
Contractual	$11.0	$5.2
Commodities	$3.4	$0.5
Equipment	$0.0	$0.0
Subtotal	$99.1	$41.0
General Administration	$11.1	$5.2
Project Total	$110.2	$46.2
Full-time Equivalents (FTE)	0.9	0.4
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

			Estimated FY 2002		

Dollar amounts are shown in thousands of dollars.

Comments:

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Forest Service

FORM 3A
TRUSTEE
AGENCY
SUMMARY

8/1/00

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 01
K. Holbrook	Realty/Land Acquisition Specialist	13	3.0	7.4		22.2
L. Keeler	Lands Specialist	12	0.0	6.5		0.0
J. Swanson	Legal Examiner	9	0.5	4.8		2.4
J. Smith	Appraiser		1.0	7.4		7.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal		[redacted]	4.5	26.1	0.0	[redacted]
					Personnel Total	$32.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 01
					0.0
RT Anchorage to Cordova	0.30	2	8	0.2	2.2
RT Anchorage to Juneau	0.50	1	3	0.2	1.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$3.3

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Forest Service

FORM 3B
Personnel
& Travel
DETAIL

Contractual Costs:	Proposed FY 01
Description	
Title documents, title reports	3.2
Air Charter, 8 hours @ $400/hr.	2.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$5.2

Commodities Costs:	Proposed FY 01
Description	
supplies	0.5
Commodities Total	$0.5

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Forest Service

FORM 3B
Contractual & Commodities DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 01
			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 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Forest Service

FORM 3B
Equipment
DETAIL

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 00	Proposed FY 01
Personnel	$45.7	$49.4
Travel	$19.1	$12.6
Contractual	$4.0	$11.4
Commodities	$1.5	$1.5
Equipment	$0.0	$0.0
Subtotal	$70.3	$74.9
General Administration	$7.1	$8.2
Project Total	$77.4	$83.1
Full-time Equivalents (FTE)		0.7

LONG RANGE FUNDING REQUIREMENTS

			Estimated FY 2002		

Dollar amounts are shown in thousands of dollars.

Other Resources								

Comments:

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Fish & Wildlife Service

FORM 3A
TRUSTEE
AGENCY
SUMMARY

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 01
						0.0
Mullaney	Realty Specialist	12	4.0	6.6	0.0	26.4
S. Shuck	Supv. RS	13	1.0	8.2	0.0	8.2
Walsh	Realty Specialist	9	2.0	4.9	0.0	9.8
Johnson	Appraiser		0.3	7.6	0.0	2.3
Peterson	Clerk		1.0	2.7	0.0	2.7
					0.0	0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		8.3	30.0	0.0	
					Personnel Total	$49.4

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 01
					0.0
Travel to Kodiak: negotiations, contaminant inspections, appraisal	0.4	5			2.0
Travel to Alaska Peninsula: negotiations, contaminant inspections, appraisal	0.4	1			0.4
					0.0
Charter airfare to inspect parcels and locate remote landowners	1.5	2			3.0
Lodging and per diem for above travel			16	0.15	2.4
Travel for legal counsel (Barry Roth)	1.6	3			4.8
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$12.6

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Fish & Wildlife Service

FORM 3B
Personnel
& Travel
DETAIL

Contractual Costs:	Proposed FY 01
Description	
Title insurance, escrow, and closing costs:	
10-acre parcels (40 parcels at $200 each)	8.0
AKI V	0.5
Koniag nondevelopment easement extension	0.5
Native allotments -- KAP 281, 283, 285 ($800/parcel)	2.4
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$11.4

Commodities Costs:	Proposed FY 01
Description	
Office Supplies	1.5
Commodities Total	$1.5

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Fish & Wildlife Service

FORM 3B
Contractual & Commodities DETAIL

Prepared: 8/1/00

New Equipment Purchases:			
Description	Number of Units	Unit Price	Proposed FY 01
			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 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: US Fish & Wildlife Service

FORM 3B
Equipment
DETAIL

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 00	Proposed FY 01	LONG RANGE FUNDING REQUIREMENTS					
						Estimated FY 2002		
Personnel	$13.0	$13.0						
Travel	$0.6	$0.6						
Contractual	$0.2	$0.2						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$13.8	$13.8						
General Administration	$2.0	$2.0						
Project Total	$15.8	$15.8						
Full-time Equivalents (FTE)		0.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Fish & Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FY 01
Name	Position Description					
	Habitat Biologist III	18	2.0	6.5		13.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal	[redacted]	2.0	6.5	0.0	[redacted]
					Personnel Total	$13.0

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FY 01
Description					
					0.0
Travel to Spill Area Communities	0.1	2	2	0.2	0.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.6

FY 01

Prepared: 15 of 17

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Fish & Game

FORM 3B
Personnel
& Travel
DETAIL

8/1/00

FY 01 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FY 01
Description	
Document reproduction	0.2
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.2

Commodities Costs:	Proposed FY 01
Description	
Commodities Total	$0.0

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Fish & Game

FORM 3B
Contractual & Commodities DETAIL

New Equipment Purchases:		Number	Unit	Proposed
Description		of Units	Price	FY 01
				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	Inventory
Description	of Units	Agency

FY 01

Project Number: 01126
Project Title: Habitat Protection & Acquisition Support
Agency: AK Dept. of Fish & Game

FORM 3B
Equipment
DETAIL

approved TC 8-3-00

Chugach Native Region Clam Restoration

Project Number:	01131
Restoration Category:	General Restoration
Proposer:	D. Daisy/CRRC
Lead Trustee Agency:	ADFG
Cooperating Agencies:	None
Alaska SeaLife Center:	No
New or Continued:	Cont'd
Duration:	6th yr. 6 yr. project
Cost FY 01:	$10.5
Cost FY 02:	$0.0
Geographic Area:	Prince William Sound, lower Cook Inlet
Injured Resource/Service:	Clams, subsistence

ABSTRACT

Cost effective procedures for establishing easily accessible subsistence clam populations near Alaska Native villages in the oil spill region are being established. All fieldwork has been completed on this project. Additional funding is needed to complete data analysis and final report preparation, as FY 99 fieldwork and data collection were more costly than anticipated. This project will extend the submittal of the final report from April 15, 2000 to April 15, 2001.

INTRODUCTION

A. General

The purpose of this project is to develop cost effective procedures for establishing managed populations of clams in areas that are readily accessible from Native villages in the oil spill region. These clams will be used as a source for subsistence food to replace the natural clam resource that has been lost, damaged or depleted. The project was initiated in FY 95 and all fieldwork and data collection was completed in FY 99. The villages Nanwalek, Tatitlek, Port Graham and Eyak took part in the project.

Adverse weather conditions increased the cost of the fieldwork in FY 99. The fieldwork consisted of planting the final batch of littleneck clam seed produced by the Qutekcak Shellfish hatchery and collect growth and mortality data from seed that had been planted previously. Since this was the final year of the project all fieldwork had to be completed prior to October 1, 1999 regardless of the weather. This meant that rather than canceling field trips when the weather was bad, the consultant and field crew were put on standby waiting for the weather to clear.

In addition to the extra cost of the fieldwork in FY 99 the cost for data analysis in FY 98 was greater than expected. These costs were carried over to FY 99 and added to the deficit.

NEED FOR THE PROJECT

A. Statement of Problem

Local shellfish populations, especially clams have been severely reduced as a subsistence food source for Native villages. Part of the reduced use is a loss of confidence in the safety of consuming shellfish as a result of the Exxon Valdez Oil Spill. In addition, local shellfish populations have been greatly reduced as result of hydrocarbon toxicity, sea otter predation, human over harvest and beach changes from the 1964 earthquake.

B. Rationale

This project will accomplish two things. One, it will help restore the clam resource base in the oil spill area, and two, it will enhance subsistence gathering by providing an easily accessible source of clams for subsistence use.

C. Location

The hatchery and pre-nursery work was carried out at the Qutekcak Shellfish Hatchery in Seward. Growout operations and sampling occurred in the area around the villages of Tatitlek and Eyak in Prince William Sound and in the Port Graham/Nanwalek area in Lower Cook Inlet. Pathology work was conducted in Anchorage and Juneau.

COMMUNITY INVOLVEMENT

The communities named in this project were directly involved in it. Each community decided whether or not it wanted to be involved in the project initially. Local residents were heavily relied upon to help locate existing clam populations and the areas for

reseeding. Project work involving the villages was done mostly with local labor. Community leaders were kept appraised of how the project is progressing.

PROJECT DESIGN

A. Objectives

1. Complete data analysis.
2. Complete and submit final report.

B. Methods

Objective 1. Complete Data Analysis

The hatchery staff will conduct data analysis for the hatchery, including the pre-nursery. The hatchery analyses will compare growth and survival against industry standards. Dr. Ken Brooks of Aquatic Environmental Sciences, Port Townsend, WA will conduct analyses on data from the remote nursery and growout portions of the project. The remote nursery analysis will determine the efficacy of producing 10+ mm seed clams. The growout analysis will examine growth and mortality as a function of several parameters including tidal height, rearing density and in the presence or absence of protective predator exclusion devices. All data analysis work will be completed by December 31, 2000.

Objective 2. Complete and Submit Final Report

CRRC staff will compile and edit the final report. The report will be ready for submission by April 15, 2001.

C. Cooperating Agencies, Contracts and Other Agency Assistance

There will be no agency assistance for data analysis or final report completion.

SCHEDULE

A. Measurable Project Tasks for FY 01

10/00 – 12/00
Complete data analyses.

1/01-4/01
Complete final report

B. Project Milestones and Endpoints

Objective 1.
December 31, 2000
All data analyses completed.

Objective 2.
April 15, 2001

Final report submitted

C. Completion Date
The objectives of this project will be met in FY 2001.

PUBLICATIONS AND REPORTS
April 15, 2001
Final report due

PROFESSIONAL CONFERENCES
The staff will not attend any professional conferences under this project in FY 2001.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

PROPOSED PRINCIPAL INVESTIGATOR(S)

Dave Daisy/Jeff Hetrick/Jon Agosti
Chugach Regional Resources Commission
4201 Tudor Centre Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 562-6647
Fax: (907) 562-4939

PERSONNEL
PATRICIA BROWN SCHWALENBERG
6450 Andover Drive
Anchorage, Alaska 99516
907 345-2187

Employment:
June 1994 to Present: Executive Director Chugach Regional Resource Commission. Responsible for Natural Resource and Fisheries development for the seven native villages in the Chugach region. This includes administering office staff, village projects in mariculture and fisheries and protecting and enhancing subsistence opportunities.

October 92 to June 1994: Office Manager Bering Sea Commercial Fisheries Development Foundation. Responsibilities included maintaining all management systems for the organization including financial, personnel, property and central filing. She was responsible for financial management and accountability of all grants, payroll, taxes and financial statements, and organizing and overseeing public relations.

October 1987 to June 1992 Society Administrator /Public Relations Director. Native American Fish and Wildlife Society. Assisted in the establishment and development of a national office for the Native American Fish and Wildlife Society. Implemented personnel policies and procedures, property management policies, record and financial

management systems. Implemented strategies to obtain goals and objectives of the society.

Education:
Business Administration University of Alaska-Anchorage (ongoing).
Certification of Completion. 1977 Humboldt Institute

DAVID DAISY
3936 Westwood Drive
Anchorage, Alaska 99517
(907) 243-8544

Employment:
October, 1987-Present: Fisheries consultant with emphasis on aquaculture. Contractor to Chugach Regional Resource Commission developing salmonid hatcheries at Port Graham and Nanwalek and oyster mariculture operations at Tatitlek and Chenega Bay. Oversight and management of these projects involves grant writing and financial and activity reporting to granting agencies.

February, 1979 to October, 1987: Regional Program Manager, Region II, Fisheries Rehabilitation, Enhancement and Development (FRED) Division, Alaska Department of Fish & Game. Under general supervision of the FRED Director, responsible for the planning, development, operation and control of the State's salmonid enhancement and rehabilitation program in Region II which encompasses all of Alaska except Southeast.

November, 1977 to February, 1979: Regional Project Manager: Cook Inlet - Prince William Sound, Fisheries Rehabilitation, Enhancement and Development (FRED) Division, Alaska Department of Fish & Game. Under supervision of the Regional Program Manager responsible for the implementation and control of salmon enhancement research and development projects in the Prince William Sound and Cook Inlet areas. Assisted the Regional Program Manager in hatchery development planning.

April, 1968 to February, 1979: Management Biologist, Commercial Fisheries Division, Alaska Department of Fish and Game in the Ketchikan, Cook Inlet and Upper Cook Inlet areas. Oversaw various management projects (weirs, counting towers, fisheries sampling) determined and set fishing periods for herring and salmon and responsible for meeting escapement and recruitment goals.

Education:
B.Sc. Fisheries, University of Massachusetts, Amherst, 1965.

JEFF HETRICK
P. O. Box 7
Moose Pass, Alaska 99631
(907) 288-3667

Employment:
1987- Present: Hatchery Manager Cook Inlet Aquaculture Association. Manage Trail Lakes Hatchery which produces 12 million sockeye salmon fry and 2 million sockeye salmon smolts annually.
1988-Present: Consultant for Shellfish Culture. Clients include:
Chugach Regional Resource Commission- develop oyster farms at Chenega Bay and Tatitlek. Included permitting, farm design, training and marketing.
Qutekcak Native Tribe- Design and develop first shellfish hatchery in Alaska.

1983-1987 Assistant Manager. Alaska Department of Fish and Game.
Assistant manager at Main Bay (Chum and Sockeye Salmon) and Cannery Creek (Pink Salmon) Hatcheries in Prince William Sound.

Education:
MBA California Coast University- Thesis under review
B.Sc. Biological Sciences. University of Maryland, 1980

DR. KENNETH M. BROOKS
644 Old Eaglemount Road
Port Townsend, WA 98368
(360) 732-4464

Employment

1959-1979	U.S. Navy Officer - retired in 1959
1979-1992	Owner/operator of Black Angus ranch
1982-1992	Environmental mediator for Washington state
1988-1990	Battelle Marine Science Laboratory, NORCUS grant
1989-present	President, Aquatic Environmental Sciences, Port Townsend, WA
1993-present	Director, Fisheries Technology Program, Peninsula College

Education
B. Sc. - Physics, Naval Postgraduate School (NPS), 1973
M. Sc. - Physics, NPS, 1974
Ph.D. - College of Ocean Sciences and Fisheries, University of Washington, 1991

John L. Agosti
P. O. Box 369
Seward, AK 99664
(907) 224-5181

Employment

1983-1984	Hatchery Technician, Westcott Bay Sea Farm, Friday Harbor, WA

1984-1986 Research Consultant, Ketron Island Sea Farm, Stellacoom, WA
1986-1996 Assistant Hatchery Manager, Westcott Bay Sea Farm, Friday Harbor, WA
1996-present Hatchery Manager, Qutekcak Shellfish Hatchery, Seward, AK

Education
B. Sc., Biological Oceanography, Humbolt State University, 1984

David Daisy
2826 54TH ST S
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Voice/Fax (727) 322-9810; cell (907) 227-0022
email: ddaisy@tampabay.rr.com

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Approved 8-3-00

Budget Category:	Authorized FY 2000	Proposed FY 2001
Personnel		$0.0
Travel		$0.0
Contractual		$9.9
Commodities		$0.0
Equipment		$0.0
Subtotal	$0.0	$9.9
General Administration		$0.6
Project Total	$0.0	$10.5
Full-time Equivalents (FTE)		0.0
Other Resources		

LONG RANGE FUNDING REQUIREMENTS					
		Estimated FY 2001	Estimated FY 2002		
		$10.5	$0.0		

Dollar amounts are shown in thousands of dollars.

Comments:

FY01

Prepared: 4-12-00

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2000
						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		0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 2000
					0.0
					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

FY01

Prepared: 4-12-00

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FY 2000
Description	
Contract with Chugach Regional Resources Commission	9.9
	0.0
	0.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$9.9

Commodities Costs:	Proposed FY 2000
Description	
Commodities Total	$0.0

FY01

Prepared: 4-12-00

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 3B
Contractual & Commodities DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2000
			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

FY01

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 3B
Equipment
DETAIL

Prepared: 4-12-00

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 2000	Proposed FY 2001	LONG RANGE FUNDING REQUIREMENTS					
Personnel		$0.0						
Travel		$0.0						
Contractual		$9.0						
Commodities		$0.0						
Equipment		$0.0						
Subtotal	$0.0	$9.0			Estimated FY 2001	Estimated FY 2002		
Indirect		$0.9						
Project Total	$0.0	$9.9			$9.9	$0.0		
Full-time Equivalents (FTE)		0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

FY01

Prepared: 4-12-00

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 4A
Non-Trustee
SUMMARY

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Personnel Costs:			Months	Monthly		Proposed
	Name	Position Description	Budgeted	Costs	Overtime	FY 2000
						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	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FY 2000
					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
					Travel Total	$0.0

FY01

Prepared:

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 4B
Personnel
& Travel
DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed
Description	FY 2000
Contract with Dr. Brooks for Final Report preparation	9.0
	0.0
	0.0
	0.0
	0.0
Contractual Total	$9.0

Commodities Costs:	Proposed
Description	FY 2000
	0.0
Commodities Total	$0.0

FY01

Prepared: 4-12-00

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 4B
Contractual & Commodities DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2000
			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	

FY01

Project Number: 01131
Project Title: Chugach Native Region Clam Restoration
Agency: Alaska Department of Fish and Game

FORM 4B
Equipment
DETAIL

Prepared: 4-12-00

Approved TC 8-3-00

Common Murre Population Monitoring

Project Number:	01144
Restoration Category:	Restoration Monitoring
Proposer:	DOI-FWS
Lead Trustee Agency:	USFWS
Cooperating Agencies:	None
Alaska SeaLife Center:	
Duration:	1.5 years
Cost FY 01:	$46,500
Cost FY 02:	$14,000
Geographic Area:	Field work will be conducted at the Chiswell Islands murre colonies in FY 01.
Injured Resource/Service:	Common murres

ABSTRACT

This proposed common murre *(Uria aalge)* restoration monitoring project is related to Projects 98144 (a murre population monitoring study that censused the Chiswell Islands nesting colonies in FY 98) and 99144 (another murre population monitoring study that censused the Barren Islands nesting colonies in FY 99). It is based on the recommendation made at the conclusion of the FY 98 study to recount the Chiswell Islands murre colonies in FY 00 or FY 01, and it is designed to collect additional murre population numbers data at this injured nesting complex. Data will be compared with counts made at the Chiswell Islands in 1989-1992 and 1998, and the results of these analyses will be used in combination with results from the 1989-1997 and 1999 Barren Islands murre population monitoring studies to help determine the recovery status of common murres in the spill area.

INTRODUCTION

This proposed restoration monitoring project is designed to collect additional population numbers data on common murres *(Uria aalge)* at the Chiswell Islands. It is related to Project 98144, a study that censused these nesting colonies in FY 98, and it is based on a recommendation made at the conclusion of that study to recount this injured nesting complex in FY 00 or FY 01 (see Roseneau *et al.* 1999). Recounting these colonies in FY 01, well after any lingering affects of the 1997-1998 El Niño and La Niña events have dissipated, will provide a better measurement of the Chiswell Islands postspill murre population. This information, coupled with 1989-1997 and 1999 Barren Islands census data (see Roseneau *et al.* 1999 and 2000) will allow the recovery status of this injured species to be determined more accurately in the spill area.

NEED FOR THE PROJECT

A. Statement of Problem

We censused the Chiswell Islands murre colonies in 1998, six years after the last population counts were made, to see if numbers of breeding birds had increased since the spill (see Roseneau *et al.* 1999). No evidence of an increase was found; instead a negative trend was apparent over the 9-year 1989-1998 postspill interval. However, numbers of murres were highly variable at one of the colonies in 1998, compared to previous years, and when these data were excluded from the analysis, the negative trend disappeared. These results, coupled with other observations of unstable bird numbers at the Chiswell and Barren islands nesting cliffs, suggested that our 1998 population estimate was artificially low and did not accurately reflect the number of birds actually breeding at the Chiswell Islands nesting complex (unstable attendance well beyond the time murres have normally settled down and laid eggs on nesting ledges was probably related to the strong 1997-1998 El Niño and La Niña events see Roseneau *et al.* 1999).

B. Rationale/Link to Restoration

Attendance was unstable at one of the six Chiswell Islands common murre colonies during the 1998 population monitoring counts, and as a result, the 1998 population estimate was artificially low and did not accurately reflect the number of birds actually breeding at this northern Gulf of Alaska nesting complex (unstable attendance well beyond the time murres have normally settled down and laid eggs on nesting ledges was probably related to the strong 1997-1998 El Niño and La Niña events see Roseneau *et al.* 1999). Therefore, additional data are needed to determine the true status of this injured species at this 6-island nesting complex (i.e., is the total population decreasing, as implied by the 1998 counts, or is it actually stable, or even increasing).

C. Location

The proposed FY 98 common murre population monitoring study will be conducted at the Chiswell Islands, just west of Resurrection Bay near the entrance to Aialik Bay (see Figs. 1 and 2).

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

A large format, computer-generated color poster summarizing the study results will be prepared and submitted to the Trustee Council for public display after data have been analyzed (similar posters showing results from common murre population monitoring studies 93049, 94039, 96144, 97144, and 99144 have been displayed at the Trustee Council January 1996-2000 restoration workshops). The printed posters are easy to transport and can be used by Trustee Council staff for a variety of purposes, including public displays at oil spill community meetings and schools. The

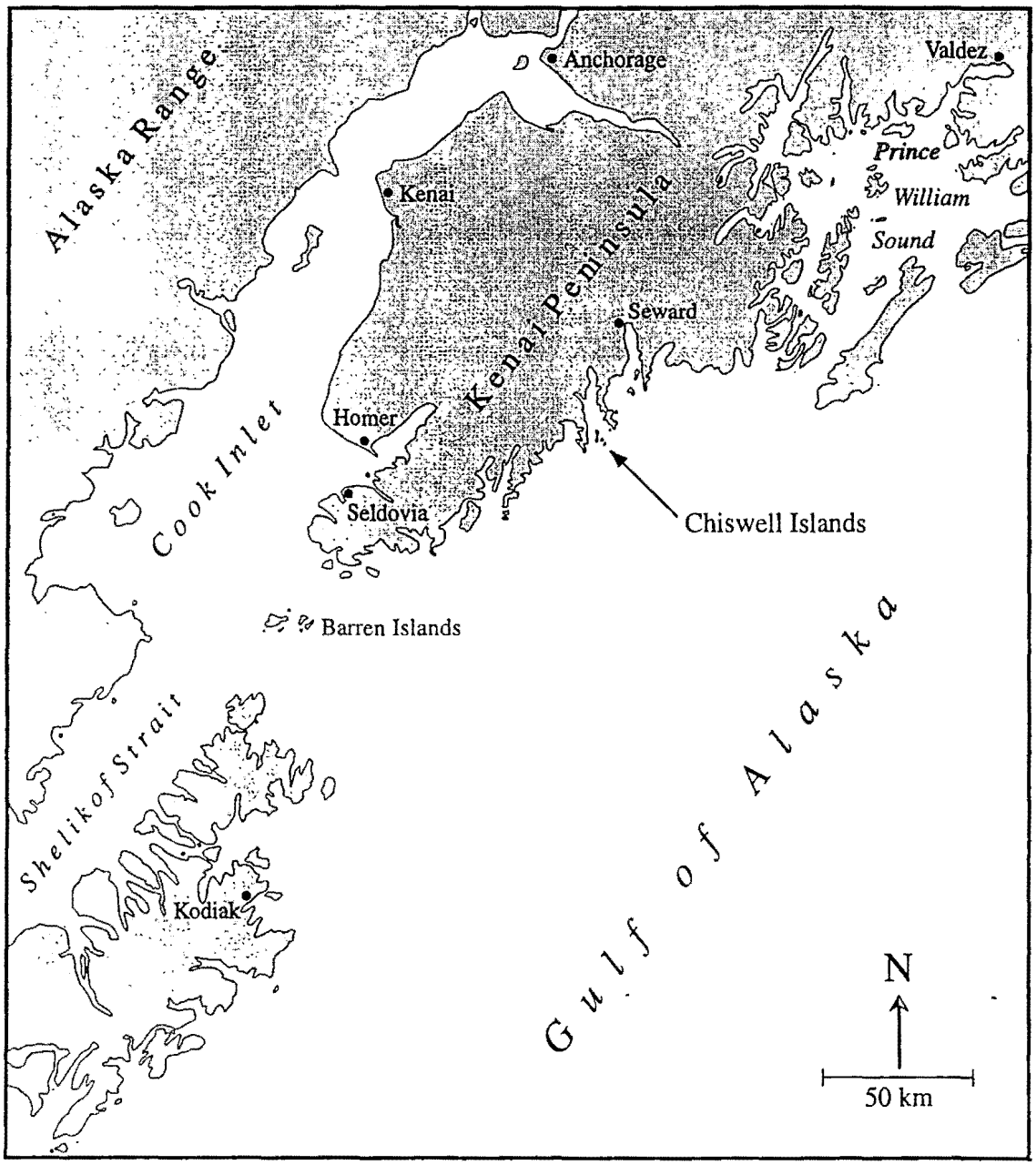

Figure 1. Location of the Chiswell Islands, Alaska.

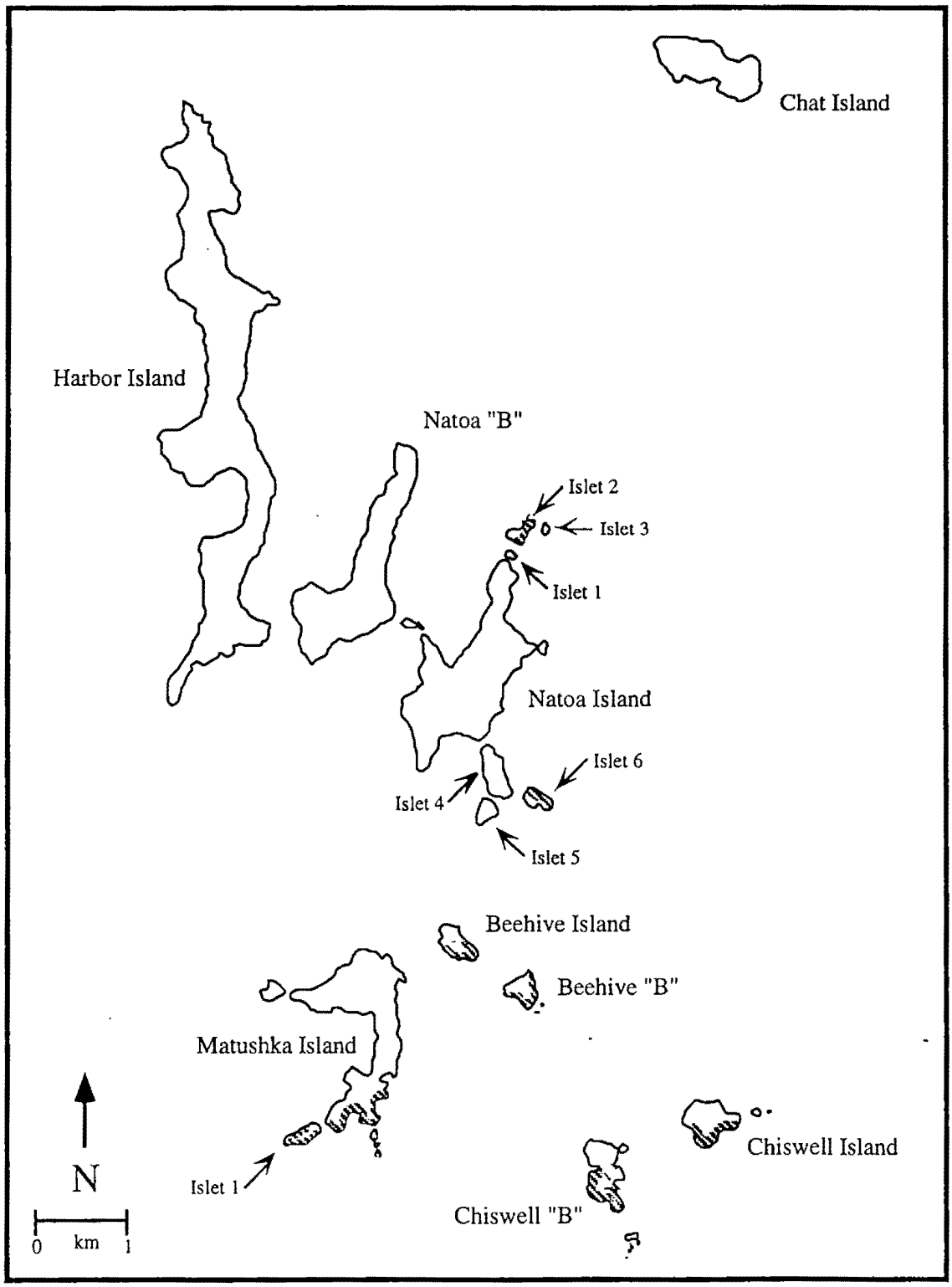

Figure 2. The Chiswell Islands study area (shaded areas show locations of murre nesting habitat).

posters and abstracts summarizing annual findings will also be available on-disk for inclusion in any on-line products that the Trustee Council may develop for public display. Copies of annual and final reports will be available to the public in Homer and Anchorage. Study results will also be presented at public Trustee Council-sponsored meetings and workshops, and in scientific publications. If a FWS research vessel is not available to support the work, a vessel will be chartered locally (e.g., Seward, Homer). Most supplies will also be obtained locally (e.g., fuel, food).

PROJECT DESIGN

A. Objectives

The project objective is to determine if murre populations are increasing at the Chiswell Islands nesting colonies. Specific objectives are to:

1. Census the Natoa, Matuska, Chiswell, Chiswell "B", Beehive, and Beehive "B" murre colonies; pool these counts with 1989-1992 and 1998 FWS scores and 1991 Dames & Moore (D&M) estimates; and analyze the data set for trends and differences among years.

2. Discuss the Chiswell Islands results in context with 1989-1999 Barrens Islands murre population monitoring data.

B. Methods

The project is designed to help test the null hypothesis that murre populations have not increased at nesting colonies in the spill area since the time of the event. The hypothesis will be tested by censusing birds at the six Chiswell Islands nesting colonies and statistically testing the updated data set (i.e., FWS counts made in 1989-1992, 1998, and 2001; and D&M counts made in 1991) for differences among years and trends in population size (see Roseneau *et al.* 1999). Results will also be compared with 1989-1999 Barren Islands murre population numbers data (see Roseneau *et al.* 2000).

Data will be collected and analyzed by the same methods used during the 1998 Chiswell Islands murre population monitoring study (Project 98144; see Roseneau *et al.* 1999). Field work will be conducted during about 15-30 July. A 15-20 m vessel will be hired to transport personnel to and from the study area and support the census work (a relatively large vessel is needed to support personnel at this location because of strong tidal flows and exposure to the open Gulf of Alaska, rapid changes in local weather conditions, lack of suitable camp sites, and distances between the colonies and protected coves and bays; working from a support vessel is also more efficient, because the census team can remain on-station until the job is done, instead of attempting to commute back and forth to the study site).

Data Collection

The two-person census team will include at least one experienced observer (e.g., D.G. Roseneau, A.B. Kettle, G.V. Byrd). The six islands will be treated as plots, and birds will be counted from an inflatable raft using 7x42 binoculars and hand-held tally meters (see Roseneau *et al.* 1999). One team member will record plot scores without revealing his/her own count to the other observer. The recorder will compare the scores to see if they fall within 10% of each other (i.e., within 5% of their average). If they do not and if time allows, plots will be recounted until both scores fall within this range. Counts will be made by 1's or 10's, depending on plot histories, and they will be made during the part of the nesting season and time of day when attendance is most stable (i.e., between the peak of egg-laying and first sea-going of chicks, and during 1100-2000 hrs; e.g., see Byrd 1989; Hatch and Hatch 1989; Roseneau *et al.* 1995, 1996, 1997, 1998, 1999, 2000). The six colonies (Natoa, Matuska, Chiswell, Chiswell "B", Beehive, and Beehive "B") will be counted

at least five separate times on different days to provide adequate power to detect changes in numbers because of daily variation in attendance (e.g., see Byrd 1989, Hatch and Hatch 1989, Roseneau *et al.* 1999).

Data Analysis

Statistical power to detect significant changes in murre numbers is discussed in Appendix 1. Data will be analyzed by the same methods used during the 1998 Chiswell Island murre population monitoring study (Project 98144; see Roseneau *et al.* 1999). To analyze data, 1-day totals will be calculated for the 6-island nesting complex and then these scores will be averaged to obtain a six-island estimate. Results will be pooled with 1989-1992 and 1998 FWS and 1991 D&M scores (i.e., see Nysewander and Dipple 1990, 1991; Dipple and Nysewander 1992; Nysewander *et al.* 1993, Dragoo *et al.* 1995; Erikson 1995; Roseneau *et al.* 1999), and analyzed for trends and differences among years by running linear regressions and one-sample *t*-tests. The 0.1 significance level will be used to increase the power of the tests and reduce Type II error (the 0.9 confidence interval will be adequate for our purposes; see Roseneau *et al.* 1999 and 2000).

C. Cooperating Agencies, Contracts and Other Agency Assistance

A contract will be required to hire a vessel to support the FY 01 Chiswell Islands murre population monitoring counts.

SCHEDULE

A. Measurable Project Tasks for FY 01 (1 October 2000 - 30 September 2001) and FY 02 (1 October 2001 - 30 September 2002)

Schedules for the proposed FY 01 and FY 02 work are provided below.

FY 01

1 Oct 2000 – 31 Jan 2001:	Arrange vessel contract and coordinate plans with Kenai Fjords National Park staff.
1 Feb – 31 Mar 2001:	Arrange for hiring of seasonal employee.
1 – 30 Apr 2001:	Check and repair equipment and gear (e.g., boats, outboard motors, radios, binoculars, survival suits).
1-31 May 2001:	Finalize vessel contract, complete checking and repairing equipment and gear.
1-30 Jun 2001:	Check and update census plot booklets, purchase supplies.
1-14 Jul 2001:	Pack equipment and supplies, travel to Seward.
15 Jul 2001:	Depart Seward for Chiswell Islands study area.
16-30 Jul-2001:	Collect data at Chiswell Islands, as weather permits.
31 Jul 2001:	Depart Chiswell Islands study area and return to Seward.
1 Aug 2001:	Unload vessel, return to Homer.

2-31 Aug 2001:	Clean and store equipment.
1 - 30 Sep 2001:	Enter data.

FY 02

1 Oct – 31 Dec 2001:	Review and analyze 1989-1992 and 1998 FWS and 1991 D&M data.
1 Jan 2002 – 15 Mar 2002:	Prepare draft report, submit draft for in-house review.
16 Mar - 10 Apr 2002:	Finalize project report.
11 Apr 2002:	Submit final project report to Chief Scientist for peer review.

B. Project Milestones and Endpoints

Project milestones and endpoints for the proposed FY 01 and FY 02 work are listed below.

January 2001:	Vessel contract arranged and plans coordinated with Kenai Fjords National Park staff.
May 2001:	Vessel contract finalized.
Mid-July 2001:	Field initiated at Chiswell Islands murre colonies.
Late July 2001:	Field work completed at Chiswell Islands murre colonies.
March 2002:	Draft report on FY 01 Chiswell Islands field activities completed.
April 2002:	Final report on FY 01 Chiswell Islands field activities submitted to Chief Scientist.

C. Completion Date

Field work will be completed in FY 01 and a final report will be submitted to the Chief Scientist by 15 April 2002.

PUBLICATIONS AND REPORTS

A final report on the 2001 Chiswell Islands murre population monitoring study will be submitted to the Chief Scientist by 15 April 2002. Results of the study will also be included in the annual AMNWR seabird monitoring report, and reported in publications on northern Gulf of Alaska murre populations, as appropriate.

PROFESSIONAL CONFERENCES

Results from the 2001 Chiswell Islands murre population monitoring study will be presented at the Alaska Bird Conference in 2002. About $1.5K will be needed to cover the costs of one person to attend this professional meeting (results from the work may also be presented at other conferences in 2002-2003, if they are appropriate forums for the work).

NORMAL AGENCY MANAGEMENT

The proposed common murre population census work at the Chiswell Islands is not something that AMNWR or the FWS is required to do by statute or regulation. The Chiswell Islands are listed as an intermittent monitoring site for seabirds in the refuge's seabird monitoring program, and as such, these colonies are only censused opportunistically about once every 10 years. Also, because the islands are not part of the FWS's highest priority ecosystem, the Bering Sea, support for this type of work will probably not be available until overall FWS priorities change (i.e., from the Bering Sea to other officially designated ecosystems within Alaska). The proposed project is needed to obtain census data to help determine whether common murre populations are increasing at Gulf of Alaska breeding locations affected by the spill. Results of the study will be used to re-evaluate the recovery status of common murres in the spill area and help formulate management strategies for this injured species in the Gulf of Alaska.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

The proposed restoration monitoring study will be coordinated with Alaska Maritime National Wildlife Refuge work at other locations in the Gulf of Alaska. The refuge will provide several items (e.g., office space and supplies, a vehicle for transporting personnel and equipment between Homer and Seward, survival gear, radios, inflatable rafts, outboard motors, cameras, binoculars) to the project that are not required by these other studies. The project will also be coordinated with Kenai Fjords National Park staff, because the National Park Service may be conducting work in the same general area.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

No changes have been made to the project design of the FY 01 Chiswell Islands common murre population monitoring study (i.e., the project design, including methods and schedules, are the same as those proposed in the previously approved Project 98144 DPD and reported by *Roseneau et al.* 1999).

PROPOSED PRINCIPAL INVESTIGATOR

Name: David G. Roseneau
Affiliation: Alaska Maritime National Wildlife Refuge
Mailing address: 2355 Kachemak Bay Drive (Suite 101), Homer, Alaska 99603-8021
Phone number: (907) 235-6546
Fax number: (907) 235-7783
E-mail address: dave_roseneau@fws.gov

PRINCIPAL INVESTIGATOR

1. David G. Roseneau (Principal Investigator)

David Roseneau received his B.S. degree in wildlife management and M.S. degree in biology from the University of Alaska - Fairbanks in 1967 and 1972, respectively. His thesis research was on the numbers and distribution of gyrfalcons, *Falco rusticolus* on the Seward Peninsula, Alaska. He joined the U.S. Fish and Wildlife Service in January 1993 and was project leader of common murre restoration monitoring studies in the Barren Islands during 1993-1994 (Projects 93049 and 94039). Mr. Roseneau was also principal investigator of the 1995-1999 APEX Barren Islands seabird and large fish as samplers studies (Projects 95163J, 95163K, 96163J, 97163J, 97163K, 98163J, 98163K, 99163J, and 99163K), and the 1996-1997 and 1999 Barren Islands and 1998

Chiswell Islands common murre population monitoring studies (Projects 96144, 97144, 98144, and 99144). Currently, he is principal investigator of the 2000 APEX Barren Islands seabird and large fish as samplers studies (Projects 00163J and 00163K) and the 2000 Barren Islands common murre population monitoring project (Project 00144). Prior to 1993, Mr. Roseneau was a consulting biologist for over 20 years. During that time, he conducted and managed marine bird, raptor, and large mammal projects in Alaska and Canada for government agencies and private-sector clients, and he also participated in several large-scale murre *(Uria* spp.*)* population monitoring projects. In 1976-1983, as co-principal investigator of NOAA/OCSEAP Research Unit 460, he conducted monitoring studies of murres and black-legged kittiwakes *(Rissa tridactyla)* at capes Lisburne, Lewis, and Thompson in the Chukchi Sea, and St. Lawrence, St. Matthew, and Hall islands in the Bering Sea. He also studied auklets *(Aethia* spp.*)* at St. Lawrence and St. Matthew islands, and participated in murre and kittiwake projects at Bluff in Norton Sound. During 1984-1986, he also participated in monitoring studies of murres and kittiwakes in the northeastern Chukchi Sea, and in 1987-1988, 1991-1992, and 1995-1999, he conducted additional murre and kittiwake monitoring work at capes Lisburne and Thompson, and Chamisso and Puffin islands. Mr. Roseneau is experienced in collecting and analyzing data on numbers, productivity, and food habits of seabirds; relating trends in numbers and productivity to changes in food webs and environmental parameters (e.g., air and sea temperatures, current patterns); and assessing potential impacts of petroleum exploration and development on nesting and foraging marine birds. He has broad knowledge of rock climbing techniques and has operated inflatable rafts and other outboard-powered boats in the Bering, Chukchi, and Beaufort seas and on various Alaskan rivers in excess of 3,000 hrs. He has also accrued several hundred additional hours operating time in small boats and larger, more powerful vessels (e.g. 25 ft, 300-400 hp HydroSports and Boston Whalers) in Kachemak Bay, Prince William Sound, and Kenai Peninsula and Barren Island waters. During his career, Mr. Roseneau has authored and co-authored over 80 reports and publications, including about 30 on Alaskan seabirds.

Selected Seabird Publications

Murphy, E.C., A.M. Springer, and D.G. Roseneau. 1991. High annual variability in reproductive success of kittiwakes *(Rissa tridactyla* L.*)* at a colony in western Alaska. J. Anim. Ecol. 60: 515-534.

Springer, A.M., E.C. Murphy, D.G. Roseneau, C.P. McRoy, and B.A. Cooper. 1987. Paradox of pelagic food webs in the northern Bering Sea - I. Seabird food habits. Cont. Shelf Res. 7: 895-911.

Murphy, E.C., A.M. Springer, and D.G. Roseneau. 1986. Population status of *Uria aalge* at a colony in western Alaska: results and simulations. Ibis 128: 348-363.

Springer, A.M., D.G. Roseneau, D.S. Lloyd, C.P. McRoy, and E.C. Murphy. 1986. Seabird responses to fluctuating prey availability in the eastern Bering Sea. Marine Ecol. Prog. Ser. 32: 1-12.

Springer, A.M. and D.G. Roseneau. 1985. Copepod-based food webs: auklets and oceanography in the Bering Sea. Marine Ecol. Prog. Ser. 21: 229-237.

Murphy, E.C., D.G. Roseneau, and P.J. Bente. 1984. An inland nest record for the Kittlitz's murrelet. Condor 86: 218.

Springer, A.M., D.G. Roseneau, E.C. Murphy, and M.I. Springer. 1984. Environmental controls of marine food webs: food habits of seabirds in the eastern Chukchi Sea. Can. J. Fish Aquat. Sci. 41: 1202-1215.

OTHER- KEY PERSONNEL

1. G. Vernon Byrd (Project Manager)

Vernon Byrd received a B.S. degree in wildlife management from the University of Georgia in 1968, did post-graduate studies in wildlife biology at the University of Alaska-Fairbanks in 1975, and completed a M.S. degree in wildlife resources management at the University of Idaho in 1989.

His thesis, entitled "Seabirds in the Pribilof Islands, Alaska: Trends and monitoring methods", explored statistical procedures for analyzing kittiwake *(Rissa* spp.*)* and murre *(Uria* spp.*)* population data. Mr. Byrd has worked for the U.S. Fish and Wildlife Service for over 20 years, focusing on studies of marine birds in Alaska and Hawaii. His major interests center around monitoring long-term trends in seabird populations, including numbers of birds and reproductive performance, and he has worked at murre colonies in the Aleutian Islands, the Bering and Chukchi seas, and western Gulf of Alaska. Mr. Byrd was a co-author of the final T/V *Exxon Valdez* oil spill damage assessment report for murres. Also, he was project manager of the 1993-1994 Barren Islands common murre restoration monitoring projects (Projects 93049 and 94039), the 1995-1999 APEX Barren Islands seabird and large fish as samplers studies (Projects 95163J, 95163K, 96163J, 97163J, 97163K, 98163J, 98163K, 99163J, and 99163K), the 1996-1997 and 1999 Barren Islands and 1998 Chiswell Islands common murre population monitoring projects (Project 96144, 97144, and 98144), and EVOS-sponsored work designed to remove predators from seabird nesting habitats (Projects 94041 and 95041). Currently, Mr. Byrd is project manager of the 2000 APEX Barren Islands seabird and large fish as samplers studies (Projects 00163J and 00163K) and the 2000 Barren Islands common murre population monitoring project (Project 00144). He has authored and co-authored over 50 scientific papers and 70 U.S. Fish and Wildlife Service reports on field studies, and has made about 35 presentations on seabirds at scientific conferences and meetings. Mr. Byrd is the supervisory wildlife biologist at the Alaska Maritime National Wildlife Refuge, the premier seabird nesting area in the national public land system.

Selected Seabird Publications

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

Byrd, G.V., and J.C. Williams. Whiskered Auklet. 1993. A chapter describing the biology of the species *in* The birds of North America, No. 76 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia PA, and the American Ornithologists' Union, Washington, D.C. 12 pp.

Byrd, G.V., and J.C. Williams. Red-legged Kittiwake. 1993. A chapter describing the biology of the species *in* The birds of North America No. 60 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia PA, and the American Ornithologists' Union, Washington, D.C. 12 pp.

Springer, A.M. and G.V. Byrd. 1989. Seabird dependence on walleye pollock in the southeastern Bering Sea. Pages 667-677 *in* Proceedings of the International Symposium on the Biology and Management of Walleye Pollock. Alaska Sea Grant Rep. No. 89-1, Univ. of Alaska-Fairbanks.

2. Arthur B. Kettle (Biological Technician)

Arthur Kettle received his B.A. degree in Human Ecology from the College of the Atlantic in 1984. Since that time, he has participated in several large-scale seabird research projects at remote locations. He joined the U.S. Fish and Wildlife Service in May 1993, and is currently the field team leader for the upcoming 2000 APEX Barren Islands seabird studies (Project 00163J) and the 2000 Barren Islands common murre population monitoring project (Project 00144). He served as field team leader during the 1995-1999 APEX Barren Islands seabird studies (Projects 95163J, 96163J, 97163J, 98163J, and 99163J), and participated in the 1996-1997 and 1999 Barren Islands and 1998 Chiswell Islands common murre population monitoring projects (Projects 96144, 97144, 98144, and 99144). He was also in charge of field work at East Amatuli Island during the 1993-1994 Barren Islands common murre restoration monitoring projects (Projects 93049 and 94039). Mr. Kettle also censused murres at the East Amatuli Island - Light Rock colony during Exxon-sponsored University of Washington studies in 1990-1992, and in addition to this work, he participated in large-scale University of Washington studies of magellanic penguins *(Spheniscus magellanicus)* in Argentina during 1987-1991, and tufted puffins *(Fratercula cirrhata)* and fork-tailed storm-petrels *(Oceanodroma furcata)* at the Barren Islands in 1990-1992. Mr. Kettle has

over 20 years experience safely operating small boats in the north Atlantic and Pacific oceans (e.g., Maine and Alaska), including 10 consecutive field seasons running outboard-powered craft at the Barren Islands.

Selected Seabird Publications

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Appendix 1. Power analysis of common murre counts in the Barren Islands, Alaska.[1]

We know from prior work that a total of about 5-7 counts made on separate days are needed in each year to detect among-year differences of 20% at the $P = 0.1$ level with 90% power (see Byrd 1989, Hatch and Hatch 1989). Using a computer program called "TRENDIO" written by T. Gerrodette (i.e., Gerrodette 1987), we ran a series of simulations to predict the number of surveys needed and the number of years required at different survey intervals to detect a significant positive trend in murre populations with the following assumptions:

1. *Rate of Change*: 2 levels (8% yr^{-1} and 13% yr^{-1}) — these levels were chosen because they represent the normal range of values reported in the literature for common murres.

2. *Coefficient of Variation CV)*: 15% was used because that is the average value recorded for counts made in the Barren Islands during 1992-1994.

3. Alpha (α) and Beta (β) Levels: We were more concerned about Type II errors than Type I errors; therefore we relaxed Alpha to 0.1 and set the power at 0.9.

4. *Model Selection*: Murre populations are expected to grow exponentially rather than in a linear fashion.

Table 1. Summary of power analysis simulation for detecting a significant positive trend (1-tailed) in murre populations in the Barren Islands.

Rate of Change ($year^{-1}$)	Years Between Surveys	CV	α	β	Number of Surveys Required[a]	Number of Years Required to Detect Trends
0.8	1	0.15	0.1	0.9	7	7
	2	0.15	0.1	0.9	5	10
	3	0.15	0.1	0.9	4	12
	4	0.15	0.1	0.9	4	16
	5	0.15	0.1	0.9	4	20
0.13	1	0.15	0.1	0.9	5	5
	2	0.15	0.1	0.9	4	8
	3	0.15	0.1	0.9	4	12
	4	0.15	0.1	0.9	3	12
	5	0.15	0.1	0.9	3	15

[a] Each survey would include 5 replicate counts. Increasing the number of replicate counts to 10 would reduce the CV to 0.10 and generally reduce the number of surveys needed by 1 in each category.

Conclusions: If murre populations in the T/V *Exxon Valdez* oil spill area are increasing at 8% yr^{-1}, it would require 7 years of annual surveys (at 5 replicate counts yr^{-1}) to detect a significant trend at the 0.1 level with 90% power. However, if the number of replicates yr^{-1} were increased to 10, it would take only 6 years of annual surveys to detect a significant trend at the same level. If populations were increasing at 13% yr^{-1}, the same comparisons listed above would require 4 and 5 years, respectively. If surveys were conducted every 3 years (5 replicate counts yr^{-1}), it would take 12 years, whether the rate of increase was 8% or 13% (rounding in the reason the values are the same), but increasing the number of replicates yr^{-1} to 10 would reduce the time required to detect a trend to 9 years. Surveys conducted at 5-year intervals would take 15 to 20 years (at 5 replicate counts yr^{-1}) to detect a significant trend in population size.

[1] Information in this power analysis is applicable to the Chiswell Islands murre colonies; copies of the analysis can be obtained from the Alaska Maritime NWR upon request. Contact D.G. Roseneau or G.V. Byrd at (907) 235-6546.

Approved TC 8-3-00

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 2002	Estimated FFY 2003	Estimated FFY 2004	Estimated FFY 2005	Estimated FFY 2006	Estimated FFY 2007
Personnel	$11.0	$14.6						
Travel	$2.3	$1.2						
Contractual	$0.0	$24.0						
Commodities	$0.4	$1.8						
Equipment	$0.0	$1.0						
Subtotal	$13.7	$42.6						
General Administration	$1.7	$3.9						
Project Total	$15.4	$46.5	$14.0					
Full-time Equivalents (FTE)	0.3	0.4						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This project is designed to monitor the recovery of murres (*Uria* spp.) at colonies in the Gulf of Alaska affected by the T/V *Exxon Valdez* oil spill. It is based on a recommendation made at the conclusion of Project 98144 to recount the Chiswell Islands murre colonies in 2000 or 2001 (see Roseneau *et al.* 1999).

Travel costs to attend the 2002 EVOS workshop in Anchorage and the 2002 Alaska Bird Conference are included in the estimated FFY 2002 budget.

The FWS is donating up to 1 month of the project manager's time at no extra cost to the project.

2001

Prepared: 03/31/00

Project Number: 01144
Project Title: Common Murre Population Monitoring
Agency: DOI-FWS

FORM 3A
TRUSTEE
AGENCY
SUMMARY

6/12/97

2001 EXXON VALDEZ TRUSTI OUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2001
David G. Roseneau	Project Leader (Principal Investigator)	GS11/6	2.0	5.4	0.0	10.8
Arthur B. Kettle	Biological Science Tech. (Wildlife)	GS7/1	1.0	3.5	0.3	3.8
G. Vernon Byrd	Project Manager	GS13/1	1.0	0.0	0.0	0.0
C. Berg	Program Manager	GS12	0.5	0.0	0.0	0.0
	Subtotal		4.5	8.9	0.3	
					Personnel Total	$14.6

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 2001
Travel to Seward to conduct surveys (personnel may need to overnight in Seward because of bad weather (2 people for 3 days @ $200.00/day)			6	0.2	1.2
				Travel Total	$1.2

2001

Prepared: 03/31/00

Project Number: 01144
Project Title: Common Murre Population Monitoring
Agency: DOI-FWS

FORM 3B
Personnel
& Travel
DETAIL

6/12/97

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed
Description	FFY 2001
12 vessel days @ $2!0K/day = $24.0K (a large vessel is needed to support the counts & transport census teams to the study area)	24.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$24.0

Commodities Costs:	Proposed
Description	FFY 2001
Fuel (outboard gas & oil; estimated @ $0.15K)	0.2
Other field supplies (maps, notebooks, film =$ 0.1K; boating supplies, including rope, paddles, spark-plugs, emergency flares & other survival gear = $0.6K; replacement of rain gear, rubber boots, waterproof bags = $0.3K)	1.0
Costs of producing & printing 2 large format posters for public display of project results	0.6
[Note: FWS will furnish office materials and additional boating supplies.]	
Commodities Total	$1.8

2001

Prepared: 03/31/00

Project Number: 01144
Project Title: CommonMurre Population Monitoring
Agency: DOI-FWS

FORM 3B
Contractual & Commodities DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 2001
Equipment cleaning/repair/service (includes checking, cleaning, repairing & servicing binoculars, cameras, rafts, radios, outboard motors, survival suits, emergency locator beacons)			1.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$1.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Inflatable raft	1	FWS
Outboard motors	2	FWS
Hand-held VHF radios	2	FWS
Camera	2	FWS
Computer	1	FWS
Binoculars	4	FWS

[Note: FWS will also supply other items: 4 survival suits, 4 Mustang suits, & emergency gear.]

2001

Prepared: 03/31/00

Project Number: 01144
Project Title: Common Murre Population Monitoring
Agency: DOI-FWS

FORM 3B
Equipment
DETAIL

01154

Approved TC 8-3-00

Exxon Valdez Oil Spill Trustee Council

645 G Street, Suite 401, Anchorage, AK 99501-3451 907/278-8012 fax:907/276-7178

MEMORANDUM

TO: Trustee Council

FROM: Molly McCammon
Executive Director

SUBJ: Project 01154 / Archaeological Repository, Local Display Facilities and Traveling Exhibits for Prince William Sound and Lower Cook Inlet

DATE: July 26, 2000

In a resolution dated January 22, 1999, the Trustee Council authorized $2.8 million for a grant to Chugachmiut, Inc., to develop an archaeological repository for Prince William Sound and lower Cook Inlet, local display areas in seven communities in those regions, and traveling exhibits to display in the local facilities. The resolution also stated the Council's intent to provide "a reasonable amount of funding for project management and general administration to be approved by the Council." The purpose of this memo is to give you a status report on this project and request funding for support costs for the local facility display component and the traveling exhibit component for FY 01. Chugachmiut has not yet provided all the information you requested to decide whether to continue funding the repository component.

STATUS REPORT

Repository. On March 30, Chugachmiut submitted a business plan for the proposed archaeological repository in the Orca Building in Seward. The consulting firm of Northern Economics, in collaboration with Livingston Slone, conducted an independent review of the business plan on behalf of the Trustee Council. The Northern Economics review raised concerns about overly optimistic revenue projections, the adequacy of the physical facilities and the proposed prepaid lease arrangement. At its meeting on April 24, the Council asked Chugachmiut to provide additional information about the repository. On June 19, staff received a partial response to the Council's request. Missing from the response were resolutions from the boards of directors of Chugachmiut and Chugach Alaska Corporation endorsing the repository and committing financial or in-kind support. Chugachmiut has put the repository component of the project on indefinite hold while both Chugachmiut and Chugach Alaska Corporation consider the financial implications of the repository for their organizations. The Council's resolution authorizing this project allowed either the grantee or the Alaska Department of Natural Resources to terminate the project after consideration of the results of the independent review of operating costs and revenues.

For the repository component to proceed as currently proposed by Chugachmiut, the Trustee Council would need to approve a reallocation of funds. The Council authorized $1 million for the repository as Chugachmiut initially proposed. Chugachmiut has now modified its proposal by eliminating a display area in the Railroad Depot. Under the modified proposal, funding for

the repository would be reduced from $1 million to $770,000, and the remaining $230,000 would be allocated to a separate local display facility in Seward.

Local Display Facilities. This component is moving ahead smoothly. Chugachmiut issued an RFP in late April, held a pre-proposal workshop on May 25 and has received proposals for local display facilities in Cordova, Seldovia, Port Graham and Nanwalek. The proposal evaluation committee met on July 25. Recommendations are expected by August 4. Approved projects would then move ahead to the design phase, which will be completed by September 29, 2000. Proposals for facilities in the second group of communities—Valdez, Tatitlek, and Chenega Bay (a local display facility has not been approved for Seward)—would be considered in FY 01.

Traveling Exhibits. The grant agreement calls for planning and design of the first four traveling exhibits in FY 01.

SUPPORT COSTS

In September 1999, you authorized $40,400 in support costs, primarily for the development and review of the repository business plan. The repository business plan has been completed and reviewed and the support costs have been spent.

In February 2000, you authorized an additional $23,400 in support costs for the proposal solicitation and selection process for the local display facility component and development of designs for four facilities. The support costs already authorized will carry the project through the end of FY 00.

Under the grant agreement, the Alaska Department of Natural Resources would commit an additional $869,000 in grant funds in FY 01. Most of the grant funds ($680,000) would be used for NEPA compliance, business plan development, and construction for the four facilities scheduled to be approved in FY 00. In addition, grant funds would be available for proposal solicitation and selection and design for the second group of local display facilities; development of a training program for personnel in local display facilities; and planning and design for the first group of traveling exhibits. I estimate support costs for these activities to be no more than $38,800. These support costs will be allocated as follows: $11,000 for up to two months of project management, $7,600 for up to one month of oversight by Judy Bittner, the State Historic Preservation Officer; and $20,200 for General Administration. I recommend the Council adopt the following motion:

RECOMMENDATION

Recommend that the Trustee Council provide to the Alaska Department of Natural Resources funding in the amount of $38,800 for support costs for the grant award to Chugachmiut, Inc. These funds will primarily support NEPA compliance, business plan development, and construction for Cordova, Seldovia, Port Graham, and Nanwalek. These funds will also support proposal solicitation and selection and design for the second group of local display facilities; development of a training program for personnel in local display facilities; and planning and design for the first group of traveling exhibits. The authorized funds are considered capital funds and will lapse September 30, 2002. The work should be completed in FY 01.

Approved TC 8-3-00

Surveys to Monitor Marine Bird Abundance in Prince William Sound During Winter and Summer

Project Number:	01159
Restoration Category:	Monitoring
Proposer:	D. Irons, R. Suryan/USFWS
Lead Trustee Agency:	DOI
Cooperating Agencies:	None
Alaska SeaLife Center:	No
New or Continued:	Cont'd
Duration:	8th yr.
Cost FY 01:	
	$25.0
Cost FY 02:	
Geographic Area:	Prince William Sound
Injured Resource/Service:	Seabirds and sea otters

ABSTRACT

This project has conducted small boat surveys to monitor abundance of marine birds in Prince William Sound during March 1990, 1991, 1993, 1994, 1996, 1998, and 2000 and July 1989, 1990, 1991, 1993, 1996, 1998, and 2000. This data will be used to examine trends by determining whether populations in the oiled zone changed at the same rate as those in the unoiled zone. Overall population trends for Prince William Sound from 1989-2000 will also be examined. An annual report and a publication will be prepared. [NOTE: This project also requested funds ($50,000) for FY 03.]

INTRODUCTION

The waters and shorelines of Prince William Sound support abundant marine bird and sea otter (*Enhydra lutris*) populations throughout the year (Isleib and Kessel 1973, Hogan and Murk 1982, Irons et al. 1988a). Potential injuries to marine birds from exposure to the *T/V Exxon Valdez* oil spill included, but were not limited to death, changes in behavior, and decreased productivity. U. S. Fish and Wildlife Service, Migratory Bird Management conducted boat surveys in Prince William Sound prior to the *Exxon Valdez* oil spill in 1972-73 (Dwyer et al. 1976) and 1984-85 (Irons et al. 1988a,b). After the oil spill, Natural Resource Damage Assessment Bird Study Number 2 (Burn 1994, Klosiewski and Laing 1994) was initiated to document damage from the oil spill on the marine bird and sea otter populations of Prince William Sound. Data from these surveys indicated that populations of sea otters (Burn 1994) and several marine bird species (Klosiewski and Laing 1994) declined in the oil spill area. Thus, restoration projects 93045 (Agler et al. 1994c), 94159 (Agler et al. 1995a), 96159 (Agler and Kendall 1997), and 98159 (Lance et al. 1999) were initiated to continue monitoring marine bird and sea otter population abundance to assess recovery of injured species. Restoration projects 93045, 94159, 96159, and 98159 continued the original *Exxon Valdez* oil spill damage assessment study (Bird Study Number 2, Burn 1994, Klosiewski and Laing 1994) from 1989-91.

Surveys will be conducted in March and July of 2000. Based on conclusions from a power analysis (Agler 1995), we have proposed conducting the surveys every other year, until restoration has occurred. We will use data collected in 2000 to monitor the distribution and abundance of marine birds and sea otters in Prince William Sound. These data will be combined with data collected in 1989-91 (Klosiewski and Laing 1994), 1993 (Agler et al. 1994c), 1994 (Agler et al. 1995a),1996 (Agler and Kendall 1997) and 1998 (Lance et al. 1999) to examine trends in marine bird and sea otter distribution and abundance. This project will benefit restoration of Prince William Sound by determining whether populations that declined due to the spill are recovering and by identifying what species are still of concern.

Funding this year will provide the opportunity to complete an annual report from the 2000 surveys and to revise a paper that has been submitted for publication. We have already written four reports (Agler et al. 1994c, 1995a; Agler and Kendall 1997, Lance et al. 1999) and presented papers on Prince William Sound at scientific meetings. With no field work scheduled for 2001 we plan to use the time to complete the annual report and revise the paper submitted for publication.

NEED FOR THE PROJECT

A. Statement of the Problem

Almost 30,000 marine bird (Piatt et al. 1990) and 900 sea otter (DeGange and Lensink 1990) carcasses were recovered following the *Exxon Valdez* oil spill. Based on modeling studies using carcass search effort and population data, an estimated 300,000 - 645,000 marine birds were killed in Prince William Sound and the northern Gulf of Alaska (Ecological Consulting, Inc. 1991). Garrott et al. (1993) estimated that 2,800 sea otters were killed. These estimates were probably low, because they only included direct mortality occurring in the first five months after the spill.

The U. S. Fish and Wildlife Service conducted boat surveys of marine bird and sea otter populations in Prince William Sound in 1972-73 (Dwyer et al. 1976), 1984-85 (Irons et al. 1988a,b), and several years following the spill (1989, 1990, 1991, Klosiewski and Laing 1994; 1993, Agler et al. 1994c; 1994, Agler et al., 1995a; and 1996, Agler and Kendall 1997, Lance et al. 1999). Additional surveys will be conducted in winter and summer of 2000. Klosiewski and Laing (1994) documented overall declines in 15 species or species groups between 1972-73 (Dwyer et al. 1976) and the years after the spill. When comparing population estimates with 1984-85 data, Klosiewski and Laing (1994) documented decline of six species or species groups.

Burn (1994), using data from the boat surveys, documented declines in sea otter abundance in shoreline habitats of Prince William Sound following the spill. Burn (1994) detected a continuing pattern of significantly lower sea otter densities in oiled coastal areas, suggesting mortality in or displacement of sea otters from these areas.

Agler et al. (1994c, 1995a) and Agler and Kendall (1997) examined whether species shown as injured (Klosiewski and Laing 1994) had recovered. Agler et al. (1995a) found no evidence of recovery for any of the injured species. Inclusion of 1996 survey data (Agler and Kendall 1997) revealed additional information on population trends. Cormorants (*Phalacrocorax* spp.), bald eagles (*Haliaeetus leucocephalus*), and sea otters exhibited significant trends, indicating that these populations show continued injury from the spill. In addition, the other injured species, loons (*Gavia* spp.), harlequin ducks (*Histrionicus histrionicus*), black oystercatchers (*Haematopus bachmani*), common murres (*Uria aalge*), pigeon guillemots (*Cepphus columba*), and marbled murrelets (*Brachyramphus marmoratus*), did not show any significant trends (Agler and Kendall 1997) suggesting these populations have not recovered. Additionally, Agler et al. (1995a) and Agler and Kendall (1997) found that some bird populations not designated as injured (ie. goldeneyes, scoters (*Melanitta* spp.), black-legged kittiwakes (*Rissa tridactyla*), may now be showing trends consistent with injury from an oil spill. The one remaining injured species, Kittlitz's murrelet (*Brachyramphus brevirostris*), exhibited trends consistent with recovery, but since their population was declining in the unoiled zone and slightly increasing in the oiled zone it is questionable if this really indicated recovery (Agler and Kendall 1997).

B. Rationale/Link to Restoration

Restoration of marine bird and sea otter populations requires population estimates to determine whether recovery is occurring or if species are still affected by the oil spill. This project will benefit marine birds and sea otters by revealing species that show continuing injury due to the *T/V Exxon Valdez* oil spill. Agler et al. (1994a, 1995a; Agler and Kendall 1997) found additional populations that were not previously shown to be injured (ie. goldeneyes). Survey data from this project have also been used by investigators of other studies on pigeon guillemots (Greg Golet, pers. comm.), marbled murrelets (K. Kuletz, pers. comm.), Kittlitz's murrelets (B. Day, per comm.), harlequin ducks (D. Rosenberg, pers. comm.), sea ducks (D. Rosenberg, pers. comm.), black oystercatchers (B. Andres, pers. comm.), birds and forage fish (W. Ostrand, pers. comm.), herring (E. Brown, pers. comm.), and sea otters (Burn 1994).

Determination of restoration of marine bird populations requires population estimates to monitor whether recovery is occurring or if species are still affected by the oil spill. This project will benefit marine birds by using data collected from 2000 surveys to monitor population trends of species injured by the *T/V Exxon Valdez* oil spill.

This project relates to the restoration objectives of several species. The *Exxon Valdez Oil Spill Restoration Plan* (*Exxon Valdez* Oil Spill Trustee Council 1994) lists each species' restoration objectives separately. We only included objectives relating to this project:

> Cormorants - "will have recovered when their populations return to prespill levels in the oil-spill area. An increasing population trend in Prince William Sound will indicate that recovery is underway."
>
> Harlequin duck - "will have recovered when breeding and postbreeding season densities and production of young have returned to estimated pre-spill levels, or when there are no differences in these parameters between oiled and unoiled areas."
>
> Black oystercatchers - "will have recovered when populations attain pre-spill levels"
>
> Marbled murrelet - "will have recovered when populations are stable or increasing."
>
> Pigeon guillemot - "will have recovered when populations are stable or increasing."
>
> Sea otter - "will be considered recovered when population abundance and distribution are comparable to pre-spill abundance and distribution"
>
> Common loons - "will have recovered when their populations return to prespill levels in the oil-spill area. An increasing population trend in Prince William Sound will indicate that recovery is underway."
>
> Kittlitz's murrelet - No recovery objective has been identified at this time.

All of the above recovery objectives relate to determining the population abundance of injured species. This is critical to determining recovery for most species. We propose to use data from a survey of Prince William Sound during March and July 2000 to estimate population abundance and distribution of marine birds. Data will be comparable with pre- and post-spill data collected by the U. S. Fish and Wildlife Service (Dwyer et al. 1976, Irons et al. 1988a,b, Agler et al. 1994c, Klosiewski and Laing 1994, Agler et al. 1995a, Agler and Kendall 1997, Lance et al. 1999) and can be used to examine trends in abundance for these species. There are no other studies currently monitoring the populations of loons, harlequin ducks, pigeon guillemots, marbled murrelets, black osytercqatchers, and cormorants.

Additionally, Klosiewski and Laing (1994) found evidence of oil spill damage for scoters (*Melanitta* spp.), mew gull (*Larus canus*), arctic tern (*Sterna paradisaea*), and northwestern crow (*Corvus caurinus*). These species have never been added to the list of injured species and do not have restoration objectives. At the present time, this proposed study is the only study continuing to consider these species and track their populations.

Frequent monitoring needs to be conducted to ascertain trends in population abundance within Prince William Sound. We proposed conducting biannual surveys, with the years between surveys used to write reports and publications (Agler 1995). By using data from previous surveys we have conducted power analyses to examine the power to detect trends in population abundance (Taylor and Gerrodette 1993). If all other parameters are equal, power is determined by the number of surveys conducted in a given period of time. As the number of surveys increases the ability to detect a trend increases. For example, if a population had a coefficient of variation (C.V.) of 0.30 (this is higher than that of 73% of the injured species; (Agler and Kendall 1997) the ability to detect an average annual 10 % change in population is 25% with 5 surveys (Fig. 1). By conducting surveys in 2000 the number of surveys increases to 7 and the power to detect same population change increases (Fig. 1). If we continue biannual surveys, when we have completed 10 surveys the power to detect this change would be 90% (Fig. 1). Thus we feel it is important to continue these surveys to enable us to increase the ability to detect population trends. Also, we need to continue to monitor marine bird populations within the Sound in the unlikely event that another environmental perturbation occurs. Few pre-spill data were available before the *Exxon Valdez* oil spill, making it extremely difficult to determine what species were injured and to what extent (Klosiewski and Laing 1994).

C. Location

This study will be conducted in Prince William Sound. The study area includes all waters within Prince William Sound, as well as land within 100 m of the shore. Villages within Prince William Sound may be interested in the results of this study, since we will be reporting on the status of several wildlife species that are used for subsistence as well as describing the health of the Prince William Sound ecosystem.

COMMUNITY INVOLVEMENT

Copies of our reports and publications will be available for communities within Prince William Sound and other areas affected by the spill. We have and will continue to use charter boats and crews from the local area.

PROJECT DESIGN

A. Objectives

The purpose of this study is to obtain population estimates of marine birds in Prince William Sound to monitor the recovery of species whose populations may have declined due to the *T/V Exxon Valdez* oil spill and to determine whether additional species may still be affected by the oil spill. The specific objectives of this project include:

1. determine distribution and estimate population abundance, with 95% confidence limits, of marine bird populations in Prince William Sound during March and July 2000;

2. determine whether the marine bird species whose populations declined more in oiled areas than in non-oiled areas of Prince William Sound have recovered;

3. determine whether additional species show any oil spill effects;

4. support restoration studies on harlequin duck, black oystercatcher, pigeon guillemot, marbled murrelet, Kittlitz's murrelet, sea ducks, and sea otters by providing data on population changes, distribution, and habitat use of Prince William Sound populations.

B. Methods

1. Study Area

Our study area includes all waters within Prince William Sound and all land within 100 m of shore (Fig. 2). We exclude Orca Inlet, near Cordova, Alaska and the southern sides of Montague, Hinchinbrook, and Hawkins Islands (Klosiewski and Laing 1994).

2. Sampling Methods

Surveys will be conducted in FY00, using methods described in 1997 detailed project description (Agler 1997).

3. Statistical Analyses

As in previous surveys (Klosiewski and Laing 1994, Agler et al. 1994a,b,c, 1995a,b, Agler and

Kendall 1997), we will use a ratio estimator (Cochran 1977) to estimate population abundance. Shoreline transects will be treated as a simple random sample; whereas, the coastal-pelagic and pelagic transects will be analyzed as two-stage cluster samples of unequal size (Cochran 1977). To do this, we will estimate the density of birds counted on the combined transects for a block and multiply by the area of the sampled block to obtain a population estimate for each block. We then will add the estimates from all blocks surveyed and divide by the sum of the areas of all blocks surveyed. We will calculate the population estimate for a stratum by multiplying this estimate by the area of all blocks in the strata. Population estimates for each species and for all birds in Prince William Sound will be calculated by adding the estimates from the three strata, and we will calculate 95% confidence intervals for these estimates from the sum of the variances of each stratum (Klosiewski and Laing 1994).

Population estimates for each species will be combined with other post-oil spill population estimates to determine population trends. We plan to use a homogeneity of slopes test (Freud and Littell 1981) to compare population trends between the oiled and unoiled zones of Prince William Sound to examine whether species with population estimates of >500 individuals have changed over time. To do this, we must assume that marine bird and sea otter populations increase at the same rate in the oiled and unoiled zones of Prince William Sound. The $\log_{10}$ of each population estimate will be calculated after adding 0.5 to the estimate to prevent effects from using log 0. Significantly different slopes would indicate that population abundance of a species or species group changed at different rates. With the homogeneity of slopes test the probability of finding significant trends may be reduced due to annual variation among populations (J. Bart, pers comm.). To reduce the effect of annual variation, we will calculate the ratio of a species' or species group's estimated population in the oiled zone to that in the unoiled zone. We will then use linear regression analyses to determine whether there is a trend among the ratios (Agler and Kendall 1997). For species or species groups showing a significant difference in slopes or ratios, we will determine the rate of change in each zone by linear regression analyses.

To examine population trends from 1989-2000 for the entire Sound, we will calculate linear regressions of the total population estimates of each species and species group.

To map species distribution, densities will be calculated from the number of sightings on transects. For shoreline transects, we will map the density per transect, but for the pelagic and coastal-pelagic strata, we will map the density by block.

5. Statistical Justification for Proposed Monitoring Schedule

Currently, these surveys are scheduled to occur every 2 years over an unspecified time period. This schedule should be considered in light of the results of a power analysis.

To determine optimum survey frequency, we conducted a power analysis to estimate the probability of detecting trends in abundance using linear regression from a given number of samples (Taylor and Gerrodette 1993). We examined our power to detect trends when coefficient of variation (CV) of the population was 0.30 (greater than the mean CV from previous surveys for 73% of the injured species; Fig. 1) and when the CV = 0.13 (the mean

summer CV for *Brachyramphus* murrelets, an injured species; Fig. 3). Models of seabird population growth predict most species increase no more than 12% per year (Nur and Ainley 1992), so we used 10% for our comparisons.

With CV=0.30 the probability of detecting an average annual change of 10% would be 28% with the 6 surveys completed to date (Fig 1). If we continue on a biannual survey schedule, 1 more survey would be completed by 2002. With 8 surveys the probability of detecting a trend would increase to 71%. If 10 surveys were completed the probability would be 92%. For murrelets the power to detect a 10% change is now 80% (Fig. 3). This would increase to 95% with the completion of the 2000 surveys (Fig. 3).

Based on these calculations, we recommend a monitoring schedule of every two years for these surveys. The years between surveys should be used for report and publication writing.

C. Cooperating Agencies, Contracts and Other Agency Assistance

No contracts or other agency assistance will be required for data analysis and publication of results.

SCHEDULE

A. Measurable Project Tasks for FY 01 (October 1, 2000 - September 30, 2001)

October - November:	Re-write the computer programs for data analysis
March 1:	Prepare draft report of 2000 surveys
March 24-27 :	Attend Annual Restoration Workshop
April 15:	Annual report complete

B. Project Milestones and Endpoints

We will examine the project objectives after each set of surveys and publish a report.

C. Completion Date

Work will be complete when all injured species covered by the surveys have met their restoration objective and are listed as recovered.

PUBLICATIONS AND REPORTS

We plan to complete an annual report.

1.) A draft report will be submitted for peer review on March 1, 2001. The annual report will be

completed on April 15, 2001. We estimate 2 months of personnel time provided by *Exxon Valdez* Oil Spill Trustee Council (EVOS) to re-write the computer program and 3 months of personnel time provided by *Exxon Valdez* Oil Spill Trustee Council (EVOS) to prepare the draft report for review and to incorporate the reviewers' comments to revise the manuscript.

PROFESSIONAL CONFERENCES

We request no funds in FY99 from EVOS for travel to professional conferences..

NORMAL AGENCY MANAGEMENT

This project is not a part of normal agency management for the U. S. Fish and Wildlife Service in Alaska. Although considered an important ecosystem within Alaska, there are no agency funds available to survey Prince William Sound or any other region in Alaska. Although there are few agency funds to pay salaries during the report writing and publication preparation phase of the project, the Office of Nongame Migratory Bird Management is committed to this process and will donate funds needed to ensure publication of the results.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project will provide valuable information on the distribution and habitat use of marine birds and sea otters in Prince William Sound. Principle investigators from other EVOS trustee council funded projects have used our survey data in the past. Data from these surveys would be helpful for the sea otter, harlequin duck, and pigeon guillemot portions of the nearshore vertebrate predator project (\025); the black-legged kittiwake, marbled murrelet, and seabird foraging portions of the Alaska predator ecosystem experiment (\163); Kittlitz's murrelet status and ecology (\142); and harbor seal monitoring (\064).

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

During FY99 we requested $37,000 for writing reports and publications. This year we are requesting $35,700. In FY01 we plan to rewrite the computer data analysis programs, write a report, and revise a manuscript. The computer programs that were used to analyze the data need to completely rewritten, the programs that we were using were developed in 1991 and were not Y2K compliant and now they cannot be used. After the 1998 surveys, we wrote a paper and have submitted it to the Marine Pollution Bulletin. We anticipate that some time will need to be spent revising it in the next fiscal year.

PROPOSED PRINCIPAL INVESTIGATORS

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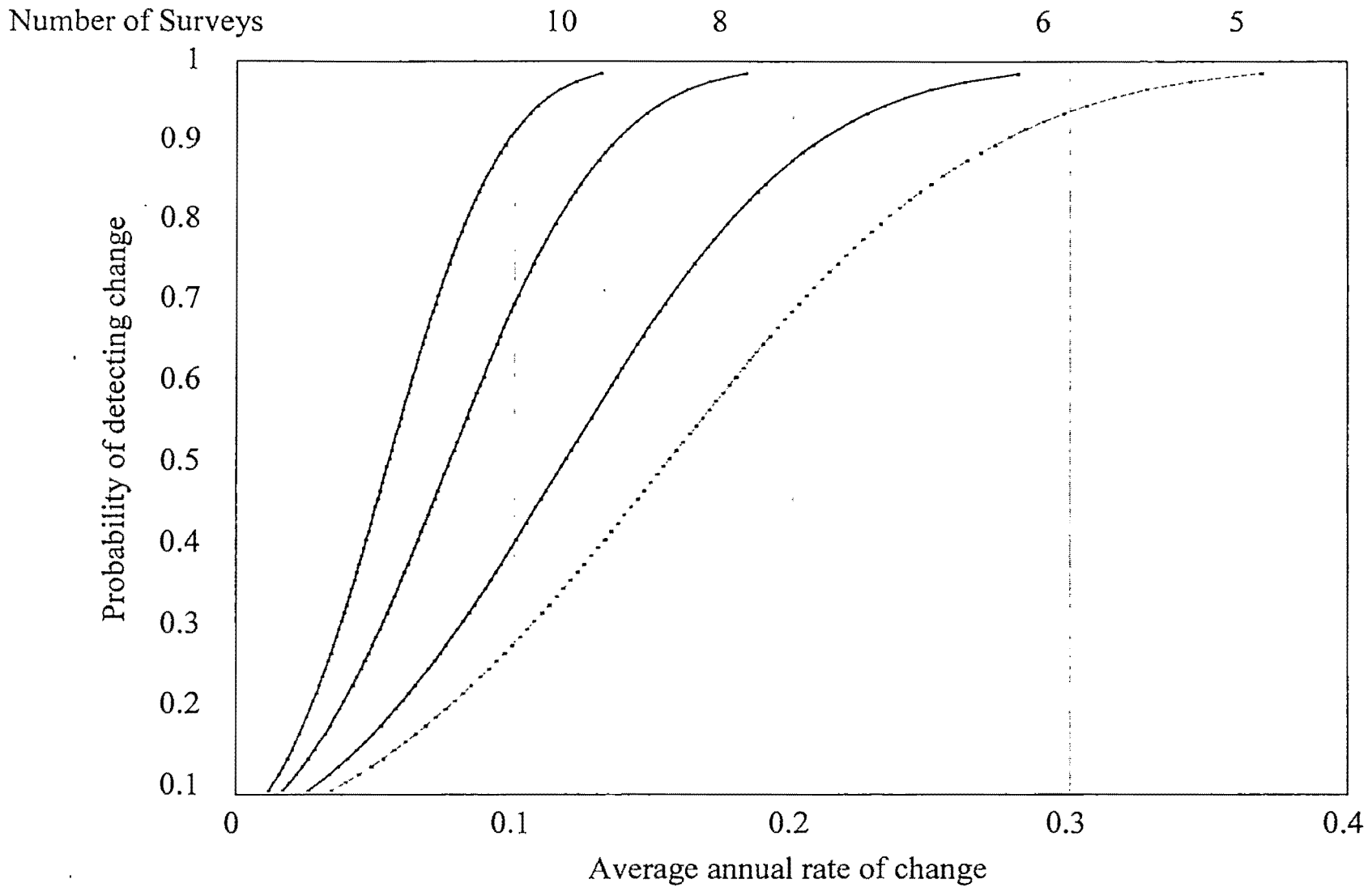


Figure 1. Estimated power (probability of detection) based on number of surveys conducted to detect a trend of marine bird and sea otter populations in Prince William Sound when CV = 0.30.

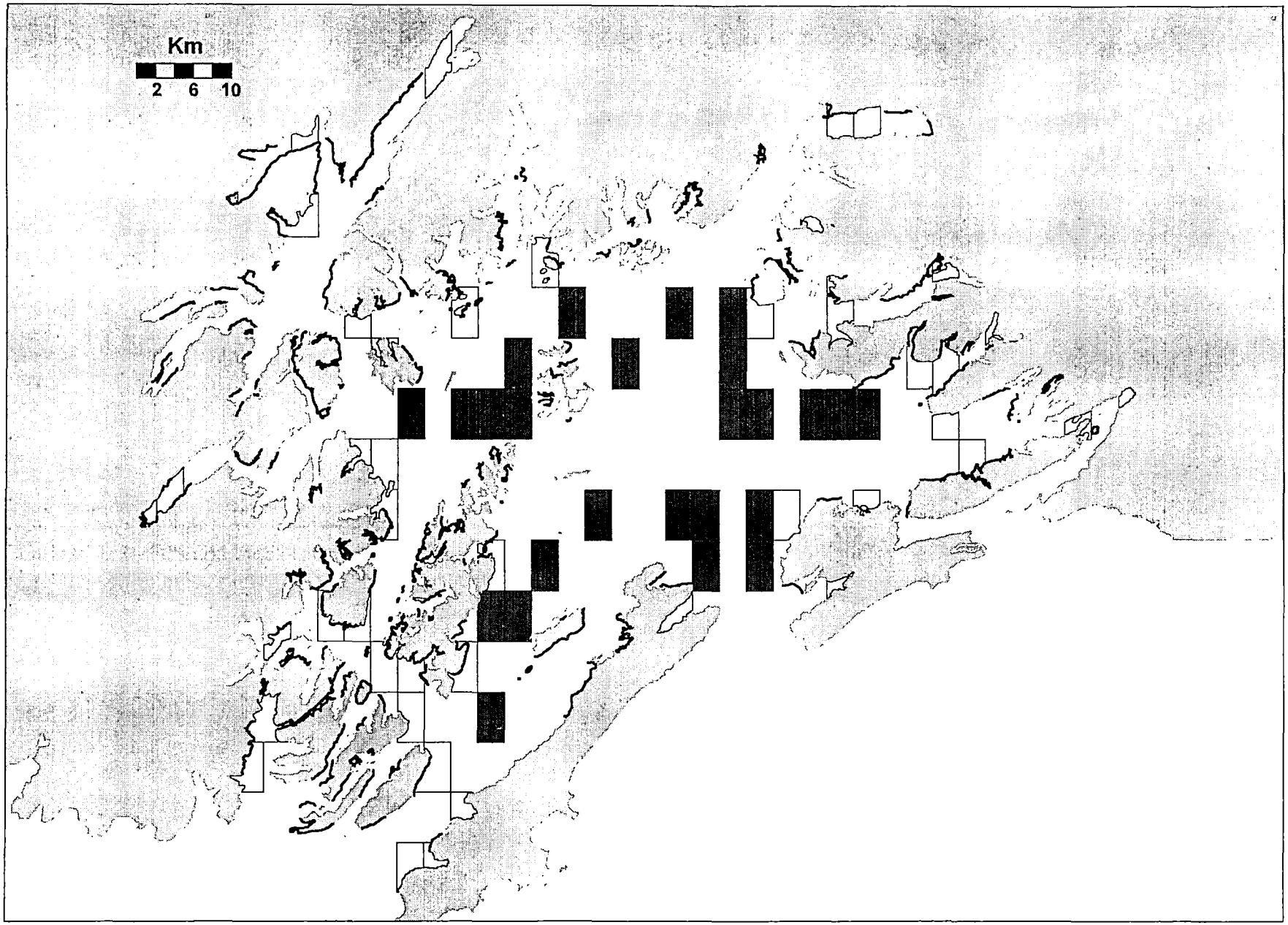


Figure 2. Transects and blocks surveyed during July small boat surveys of Prince William Sound. Transects were classified into 3 strata; the shoreline stratum, (<200 m from land), the coastal-pelagic stratum (lighter shaded blocks), and the pelagic stratum (darker shaded blocks).

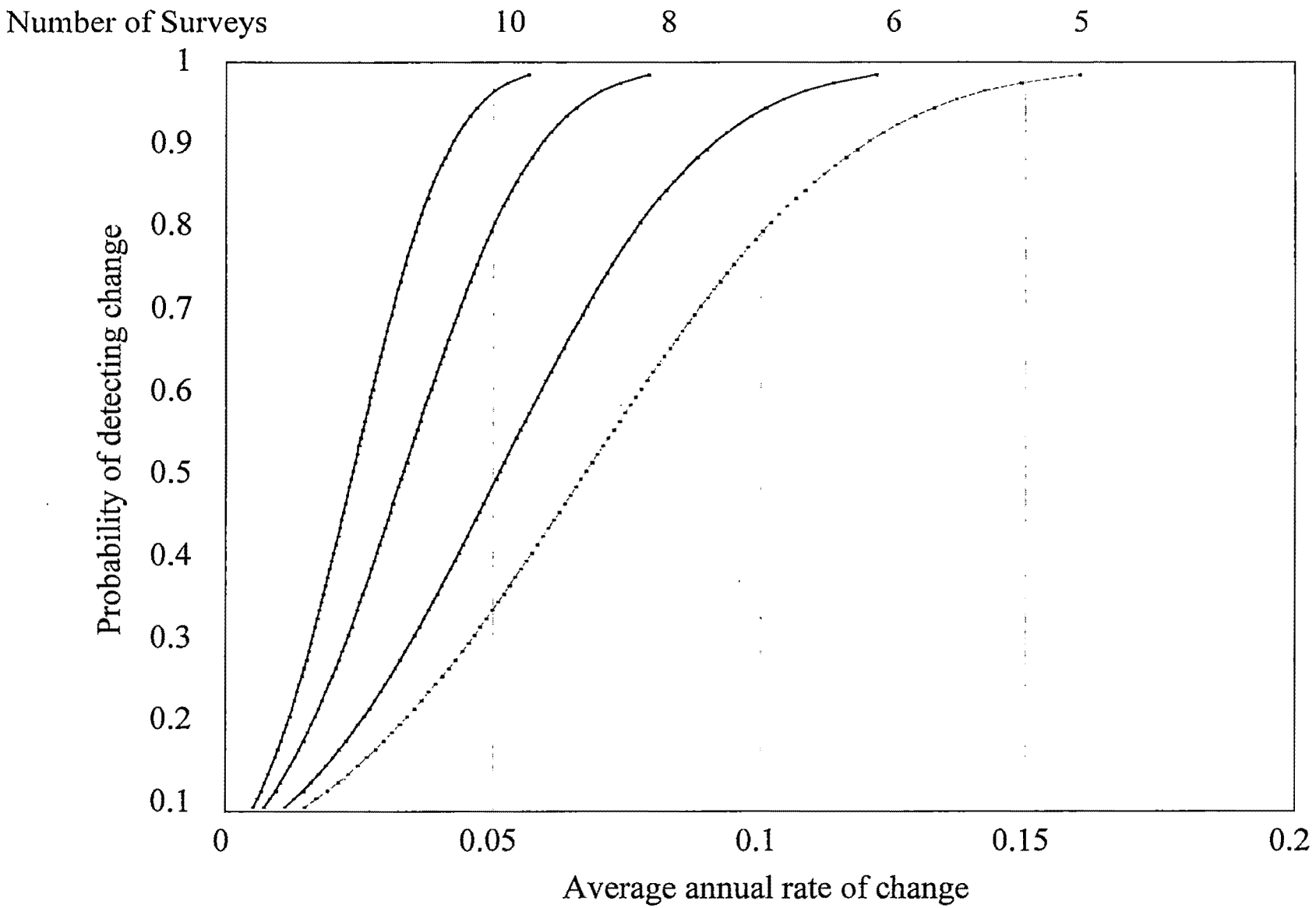


Figure 3. Estimated power (probability of detection) based on numbers of surveys conducted to detect a trend in the July *Brachyramphus* murrelet population in Prince William Sound. The CV = 0.13.

Revision 6/28/00
Approved 7-3-00

2001 EXXON VALDEZ TRUSTI JUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel		$21.7
Travel		$0.0
Contractual		$0.0
Commodities		$0.0
Equipment		$0.0
Subtotal	$0.0	$21.7
General Administration		$3.3
Project Total	$0.0	$25.0
Full-time Equivalents (FTE)		0.3
Other Resources		

LONG RANGE FUNDING REQUIREMENTS

Estimated FY 2002	Estimated FY 2003		
$251.0	$50.0		

Dollar amounts are shown in thousands of dollars.

Comments: Justification of Personnel Costs:

Publications and & Personnel Time

Final Report, 3.5 months (1 month to re-write all data analysis progroms and 2.5 months to analyze data and write report) (EVOS Funded)

Publication: Has been revised and is currently in review (USFWS funded)

We are requesting money to cover Co-PI Suryan only, Co-PI Irons's salary will be paid for by the US Fish and Wildlife Service.

FY 01

Prepared: 1 of 4

Project Number: 01159
Project Title: Surveys to Monitor Marine Bird Abundance in Prince William Sound during Winter and Summer; Report and Publication Writing
Agency: DOI - Fish and Wildlife Service

FORM 3A
AGENCY
PROJECT
DETAIL

06/28/2000

2001 EXXON VALDEZ TRUSTI)UNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FY 2001
PM	Name	Position Description					
	Suryan	Co-Project Leader	GS11 - 5	3.5	6,200		21.7
	Irons	Co-Project Leader	GS12 - 6	0.0	0		0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		3.5	6,200	0	
Those costs associated with program management should be indicated by placement of an *.						**Personnel Total**	$21.7

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FY 2001
PM	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 costs associated with program management should be indicated by placement of an *.					**Travel Total**	$0.0

FY 01

Project Number: 01159
Project Title: Surveys to Monitor Marine Bird Abundance in Prince William Sound during Winter and Summer; Report and Publication Writing
Agency: DOI - Fish and Wildlife Service

FORM 3B
Personnel
& Travel
DETAIL

06/28/2000

2001 EXXON VALDEZ TRUSTI)UNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed FY 2001
Description	
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed FY 2001
Description	
Commodities Total	$0.0

FY 01

Project Number: 01159
Project Title: Surveys to Monitor Marine Bird Abundance in Prince William Sound during Winter and Summer; Report and Publication Writing
Agency: DOI - Fish and Wildlife Service

FORM 3B
Contractual & Commodities DETAIL

2001 EXXON VALDEZ TRUSTI OUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2001
			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 01

Project Number: 01159
Project Title: Surveys to Monitor Marine Bird Abundance in Prince William Sound during Winter and Summer; Report and Publication Writing
Agency: DOI - Fish and Wildlife Service

FORM 3B
Equipment
DETAIL

06/28/2000

Approved TC 8-3-00

Construction of a Linkage Map for the Pink Salmon Genome

Project Number:	01190
Restoration Category:	Research
Proposer:	F. Allendorf/Univ. Montana
Lead Trustee Agency:	ADFG
Cooperating Agencies:	None
Alaska SeaLife Center:	Yes
New or Continued:	Cont'd
Duration:	6th yr. 7 yr. project
Cost FY 01:	$400.9
Cost FY 02:	$240.0
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink salmon

ABSTRACT

This project will continue experiments at the Alaska SeaLife Center that apply a genetic linkage map, which was constructed during the first four years of the project, to test for effects of regions of the genome on traits that are important to recovery of pink salmon (e.g., growth and survival). The map also will be used to evaluate the potential impact of hatchery-raised fish on the fitness of wild stocks. Sexually mature adults from the 1998 and 1999 cohorts produced from wild pink salmon collected from Likes Creek are expected to return to the Alaska SeaLife Center in August 2000 and 2001. Genotypes in released fry and returning adults will be compared to test for genetic differences in marine survival and other life history traits (e.g., body size, egg number, and egg size).

INTRODUCTION

This is a continuation of our project to construct a genetic linkage map for the pink salmon (*Oncorhynchus gorbuscha*) genome. Such a map was proposed initially to provide the necessary platform to identify genetic damage in pink salmon inhabiting oiled streams following the March 1989 *Exxon Valdez* oil spill (EVOS). We have initiated a series of experiments based at the Alaska SeaLife Center (ASLC) to identify regions of the genome that affect various organismal traits and to test for the effects of natural selection on regions of the genome used in describing genetic population structure. This research will aid recovery efforts with pink salmon, including estimation of straying rates, description of stock structure, and testing if marine survival and other organismal measures of phenotypic variation have a genetic basis.

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

This project began in FY 96. However, we did not receive authorization to proceed until half-way through FY 96 (March 1996). We have completed our two initial objectives that included identifying several hundred genetic markers and using them to construct a linkage map. We are now using the ASLC to continue experiments that apply the linkage map to an understanding of the fundamental population biology and genetics of pink salmon.

This work was originally designed to support work with pink salmon under the project *Oil-Related Embryo Mortalities* (Restoration Study \191A). The objective of that project was to identify germline mutations in pink salmon exposed to oil. Genetic damage induced by oil may either be small changes in nucleotide sequence (microlesions) or large-scale changes in chromosome structure (macrolesions). A detailed genetic map for pink salmon would have been invaluable for interpreting the results of Restoration Study \191A in several ways. First, it would be possible by following the inheritance of any DNA lesions to determine if they are micro- or macro-lesions. Second, these lesions could be mapped to determine if they are randomly spread throughout the genome or if they occur at mutational "hot spots" that are susceptible to oil induced damage. However, Restoration Study \191A is no longer ongoing, and thus our future work will concentrate on our original Objectives 5 and 6 as described in this proposal.

This Detailed Project Description includes an extension of our experiments to use the map to evaluate the potential impact of hatchery-raised fish on the fitness of wild stocks under the framework of our original Objectives 5 and 6 as suggested by reviewers of our proposal last year. We were not able to get permission from ADFG to bring in gametes from existing hatchery populations to cross with wild fish parents from Likes Creek. Nevertheless, we have redesigned our experiments and analysis using the approaches of Moran et al. (1997) and Doyle et al. (1995) in Atlantic salmon (*Salmo salar*) and by Unwin (1997) in chinook salmon (*Oncorhynchus tshawytscha*).

We have continued to pursue additional funding for this research through other sources. Eleanor Steinberg began work on this project in January 2000 with funding from the National Science Foundation (NSF) as a Postdoctoral Research Fellowship in Biological Informatics to assist us in the data analysis of the current proposed research (DBI-9974243). In addition, Hitachi Genetic Systems has agreed to provide a fluorescent scanner at the ASLC to genotype returning adults to this summer.

We have made one modification in our proposal this year because of some exciting and significant new results. We have found high mutation rates at two microsatellite loci. In addition, these mutations are not randomly distributed among families, but rather are "clustered" in certain families by two different mechanisms. These mutations have caused us to modify our procedures to identify returning individuals on the basis of their multiple locus genotypes. In addition, the rates and especially the patterns of mutations that we have observed have provided some important fundamental insights into the evolution of microsatellite loci and their use in population genetic studies. Results with humans have found an increase in mutation rates at minisatellite loci following exposure to radiation following the Chernobyl incident (Dubrova et al. 1996). Our recent results raise the possibility that mini- or microsatellite loci may be good candidates for monitoring germline mutations in marine species following exposure to oil.

NEED FOR THE PROJECT

A. Statement of Problem

Elevated embryo mortalities were detected in populations of pink salmon inhabiting oiled streams following the spill. These increased rates of mortality persisted through the 1993 field season, three generations after the oil spill, suggesting that genetic damage may have occurred as a result of exposure to oil during early developmental life-stages. The consequences of the putative genetic damage include impaired physiological function of individuals and reduced reproductive capacity of pink salmon populations (Bue et al. 1998).

The aggregate of evidence from field studies and incubation experiments suggests that embryos exposed to oil in 1989 and 1990 accumulated deleterious mutations in the germline (Bue et al. 1998). However, see Cronin and Bickham (1998) for an alternative interpretation of these data. This hypothesis of genetic damage is consistent with previous field observations and laboratory experiments on the effects of crude oil on early life stages of fish. Long term intra-gravel oil exposures (7-8 months) to freshly fertilized eggs provide embryos sufficient time to accumulate polynuclear aromatic hydrocarbons (PAH's) from very low aqueous concentrations of crude oil. PAH's are abundant in crude oil and are potent clastogens (i.e. capable of breaking chromosomes). Roy et al. (1999) have recently reported evidence of molecular genetic damage to pink salmon embryos exposed to crude oil.

Mironov (1969) observed reduced survival of fish embryos and larvae exposed to very low aqueous doses (1 ul oil/l seawater) of oil. Longwell (1977) reported genetic damage in pelagic embryos affected by the ArgoMerchant oil spill. Moles et al. (1987) confirmed that pink

salmon embryos take up PAH's and demonstrated that the uptake was much greater in an intertidal environment than in strictly freshwater conditions. Biggs et al. (1991) found greater numbers of chromosome aberrations in larval herring that incubated in oiled areas than in non-oiled areas. It is likely that the same type of damage may have occurred in pink salmon and other species in Prince William Sound, and this damage could have affected the germline of exposed individuals (Malkin 1994; Bue et al. 1998).

Molecular genetic techniques have been used extensively to describe population structure of Pacific salmon (Utter et al. 1993; Gharrett and Smoker 1994; Seeb et al. 1998). Genetic divergence among populations has been interpreted as largely reflecting the patterns of exchange of individuals among populations (gene flow) and random changes in frequency of selectively neutral alleles within populations (genetic drift) (Allendorf and Phelps 1981; Waples 1995). This is a useful approach that allows description of the pattern and amount of gene flow among populations.

This approach to describe population structure is based upon the assumption that the pattern and amount of divergence observed is not affected by natural selection or mutation. However, even weak natural selection may have a substantial effect on the pattern of genetic divergence among populations (Allendorf 1983). In addition, different mutation rates at marker loci may also effect the amount of genetic differentiation between populations if mutation rates are high (e.g., Jin and Chakraborty 1995). Thus, the high frequency of mutations that we have detected may also have a substantial effect on the amount and pattern of genetic divergence at some loci.

Molecular markers may be affected by natural selection even if the markers themselves are not the target of selection. Loci that are selectively neutral and have no effect on the phenotype are expected to be affected by the action of natural selection at closely linked loci (Slatkin 1995). Apparent heterozygous advantage ("associative overdominance") can result at neutral loci by linkage disequilibrium with nearby loci that are affected by natural selection (Pamilo and Pálsson 1998). Zhivotovsky et al. (1994) have recently questioned the description of genetic population structure of pink salmon and suggested that natural selection may have an important effect on allozyme frequency divergence in pink salmon.

It has been notoriously difficult to detect and measure the effects of natural selection in natural populations (Lewontin 1991). Comparing the distribution of genotypes in a single cohort followed through different life history stages is the most powerful method to detect natural selection (p. 303, Lynch and Walsh, in preparation). The facilities at the ASLC provide an exceptional opportunity to measure lifetime fitness of pink salmon from fertilization to sexual maturity of molecular genetic markers spread throughout the genome identified in previous years of this project.

B. Rationale/Link to Restoration

The recovery objective for pink salmon is healthy and productive populations that exist at prespill levels or levels in unoiled areas. An indication of recovery is when egg mortality in oiled areas match prespill or levels in unoiled areas. A genetic map would be essential for detecting and understanding causes of reduced egg and embryo survival in oiled areas (Bue et al. 1998). The genetic damage caused by exposure to oil may persist longer in populations of pink salmon than in other vertebrates because of the tetraploid nature of the salmonid genome. Salmonid fishes went through a tetraploid event some 25 million years ago that duplicated their entire genome (Allendorf and Thorgaard 1984). The extra genes in pink salmon may mask the effects of mutational damage caused by recessive deleterious alleles. The effects of these deleterious mutations may be uncovered in subsequent generations.

This research will provide a powerful test of the assumption of the absence of natural selection affecting molecular markers. This assumption is the foundation of interpreting patterns of genetic divergence among populations as reflecting patterns of genetic exchange. Evidence of natural selection affecting the molecular markers would cause a major change in the interpretation of genetic variation in natural populations of pink salmon and other species. This will be true whether the selection is acting on the markers themselves or chromosomal segments linked to the markers. Recent results from molecular studies of the genome suggest that natural selection may play a greater role than previously thought in determining the structure of the genome, including the organization of genes and chromosomes, as well as the patterns and amounts of genetic variation present (Hurst 1999).

C. Location

Gametes for the inheritance studies and linkage map were collected from Prince William Sound in collaboration with the project Oil-Related Embryo Mortalities (Restoration Study \191A). Embryo incubation took place at the Genetics Lab facilities of ADFG. The laboratory analyses were done at the University of Montana and the ADFG genetics lab in Anchorage.

We began in FY 1998 to use the ASLC Research Facilities at Seward for experiments designed to test for natural selection at loci throughout the genome of pink salmon. Sexually mature pink salmon used in the experimental matings in 1998 and 1999 were collected from Thumb Cove in Resurrection Bay. The progeny are currently being raised at the ASLC.

COMMUNITY INVOLVEMENT

This is a specialized project that will not benefit directly from the knowledge of local/traditional people. We will hire local residents when possible for assistance (e.g., collecting and maintaining fish). We have developed two computer interactive educational games to be incorporated in displays describing our project at the ASLC ("Lost Child" and "Whose Your Father?"). Amy Haddow, ASLC Education Director, is currently developing a display based upon these games. In addition, we have taken opportunities to explain our research in different Alaska high schools. Kathy Knudsen gave a presentation on this project to the freshman biology class at

Kenai High School, and Kate Lindner will discuss this study with high school students in Kongiganak this April.

We are planing informational meetings for the general public to be held at the ASLC this May. We are attempting to involve the community of Seward in our project and different aspects of the study such as collecting the returning adults. We are also interested in suggestions of other opportunities for informational meetings in the communities of Prince William Sound, and articles in the Trustee Council newsletter.

PROJECT DESIGN

A. Objectives

Our initial primary objective was to construct a detailed genetic linkage map for pink salmon by analyzing the genetic transmission of several hundred DNA polymorphisms. Pink salmon have 26 pairs of chromosomes (2N=52; Allendorf and Thorgaard 1984), and, therefore, should have a total of 27 linkage-groups: 25 autosomes, an X-chromosome, and a Y-chromosome. We plan to map enough variable markers so that a new marker can be assigned with high probability to one of the 27 linkage groups. It was impossible to know how many markers this would require because we did not know the total length of the pink salmon linkage map. The linkage map of the zebrafish (*Danio rerio*) has been estimated to be 2900 centimorgans (cM; Johnson et al. 1996) and that of the medaka (*Oryzias latipes*) to be 2480 cM (Wada et al. 1995). There currently are efforts to include zebrafish among genome projects of model species sponsored by the National Institutes of Health under the Human Genome Project (Roush 1997). Such a massive effort in zebrafish would provide extremely helpful information for understanding the genome of salmonid fishes.

We expected the pink salmon map in females to be large because of the polyploid ancestry of salmonids. Young et al. (1998) recently have published a rainbow trout (*Oncorhynchus mykiss*) linkage map based upon recombination rates in males and estimated the total map to be 2628 cM. However, the linkage map in males will be shorter than in females because of the reduced recombination rate in male salmonids (Johnson et al. 1987a). We initially anticipated that it would be necessary to map over 500 markers to ensure that new markers can be assigned to an existing linkage group with high probability (Van der Beek and Van Arendonk 1993). For example, 99% of all loci in the zebrafish were estimated to be located within 20 cM of a marker on the map based upon an earlier report using 414 markers (Postlethwait et al. 1994).

This project originally had the following overall specific objectives:

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

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

3. Map putative lesions identified in Restoration Study \191A.

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

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

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

We have completed Objectives 1 and 2. We cannot pursue Objective 3 because Restoration Study /191A did not identify any putative lesions for mapping. At present, we do not intend to pursue Objective 4 because Restoration Study \191A is no longer ongoing. However, this type of experiment to detect oil-induced lesions could be pursued in the future at the ASLC. The primary focus in FY 01 will be Objectives 5 and 6; we propose to use the linkage map to test for the phenotypic effects and adaptive significance of molecular markers throughout the genome of pink salmon.

B. Methods

OBJECTIVES 1 & 2

Our map was constructed using gynogenetic haploid and diploid progeny from an individual female (95-103). This is the same procedure that has been used to build the zebrafish linkage map (Postlethwait et al. 1994). Stanley (1983) reported that haploid embryos of Atlantic salmon will develop until just prior to the stage of hatching if development of the eggs is activated by sperm in which the DNA has been inactivated by UV-radiation. We have used this technique routinely with fishes of the genus *Oncorhynchus* (Forbes et al. 1994; Spruell et al. 1999). This allows us to follow the segregation and linkage relationships in haploid progeny from females. The use of haploid progeny avoids possible difficulties of dominance with some types of DNA markers because recessive alleles are not obscured by their dominant alternatives in haploids (Lie et al. 1994). Our map is primarily based on 602 segregating markers in 94 haploid progeny from a single pink salmon female (95-103) that returned to Armin F. Koernig hatchery in Prince William Sound in August 1995. We also have placed a number of so-called "anchor" loci on the map in the last year.

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

because of these sex-specific differences.

Construction of a full linkage map is a large task. We developed as many time and labor saving procedures as possible. Our linkage map was constructed by computer assisted analysis (MapMaker, Lander et al. 1987). We have been assisted by Mark Daly of the Whitehead Institute at MIT in using this program. We will compare the recombination rates based upon this map to rates of selected pairs of loci in males. The reduced recombination rates in salmonid males means that it will be easier to assign new markers to a linkage group using male parents. We will test joint segregation of individual markers from different linkage groups identified in females to determine if some of these separate linkage groups in females are linked in males and are therefore syntenic (on the same chromosome).

A useful genetic map contains genetic markers that are abundant, randomly distributed throughout the genome, highly polymorphic, and readily detectable in many laboratories (Jacob et al. 1995). We began using random amplified polymorphic DNA (RAPD) markers because they fit these criteria and they have been used successfully in constructing linkage maps in zebrafish and medaka (Johnson et al. 1996; Wada et al. 1995). We have switched to two other types of genetic markers that are superior to RAPDs in this work.

PINEs: There are a variety of repetitive DNA elements that are scattered throughout the genome of salmonid fishes. Greene and Seeb (1997) have described a technique that uses the sequences from a SINE (short interspersed element) and a transposon to detect many DNA polymorphisms. They have called this technique SINE-printing. We have modified this technique using other types of repetitive elements for our mapping study to detect a class of molecular markers that we call PINEs (paired interspersed nuclear elements; Spruell et al. 1999).

Kido et al. (1991) described 3 SINEs in salmonid fishes. They documented the presence of two such elements, *Hpa*I and *Sma*I, in pink salmon. Spruell and Thorgaard (1996) subsequently reported the presence of the 5'-end of the third element, *Fok*I, in pink salmon. Goodier and Davidson (1994) confirmed that salmonids also contain the transposon *Tc*1, a member of another class of repetitive elements. Both SINEs and transposons occur in high copy number and are believed to be ubiquitously dispersed throughout the genome, making them ideal candidates for genomic mapping efforts.

We have used DNA sequences from four types of repetitive elements as polymerase chain reaction (PCR) primers to generate multiple DNA fragments from a single PCR reaction in pink salmon. The theoretical basis for this procedure is similar to the use of the human SINE *Alu*I to identify human chromosomes in somatic cell hybridization experiments (Nelson et al. 1989). Primers complementary to one end of the element are oriented such that they initiate DNA synthesis from the end of the element, progressing into the surrounding genomic DNA. A single primer or combinations of primers may be used to generate multilocus patterns. Greene and Seeb (1997) used this technique to confirm the parentage of pink salmon fry, demonstrating the potential utility of including these fragments in our mapping study. We have used 12 different pairs of PINE primers to detect 162 segregating markers in our reference family.

AFLPs: Amplification fragment length polymorphisms have been used extensively in the

construction of genomic maps in plants (Maheswaran et al. 1997; Becker et al. 1995). The AFLP technique is especially advantageous for two reasons. First, many bands are produced per reaction and, therefore, more polymorphic loci are produced per unit effort. Second, the selective amplification step uses a subsample of the PCR products of the preamplification. Up to 133 selective amplifications can be completed from a single pre-amplification that originally used only 0.5 μg of genomic DNA. Much less genomic DNA is needed to produce more bands than using other methods such as RAPDs. This is an important consideration when dealing with the limited amount of tissue available from haploid embryos.

Gene-Centromere Map

We have estimated recombination rates between 312 loci and their centromeres using half-tetrad analysis in a recently published manuscript (Lindner et al. in press). We produced the half-tetrads by initiating development with irradiated sperm and blocking the maternal second meiotic division. AFLPs were significantly more centromeric than loci identified by three other techniques (allozymes, microsatellites, and PINEs). The near absence of AFLPs in distal regions could limit their utility in constructing linkage maps. A large proportion of loci had y values approaching 1.0, indicating near complete crossover interference on many chromosome arms. As predicted from models of chromosomal evolution in salmonids based upon results with allozyme loci, all duplicated microsatellite loci that shared alleles (isoloci) had y values of nearly 1.0.

The Linkage Map

We have described the segregation of 602 markers in haploid progeny from female 95-103; we have also mapped 13 allozyme loci in gynogenetic-diploid progeny from this same female. We have assigned 559 of the 598 markers to one of 42 linkage groups covering a distance of 5352 cM (Figure 1; Tables 1 and 2). Only 26 markers remain unlinked. The estimated size of the pink salmon linkage map based on these data is 6872 cM. This includes 5352 cM mapped in Figure 1, an estimated 260 cM to account for the distance from the end markers to their adjacent telomeres, and an estimated 1260 cM in unfilled gaps in the map. The haploid pink salmon genome is approximately 2.72 billion base pairs or 2.72 million kilobase pairs (kbp; Johnson et al. 1987b); thus, we estimate approximately 391 kbp/cM. Our results are consistent with the maps constructed in other fishes (Table 3). This manuscript is currently in preparation and will be submitted within three months.

Table 1. Summary of Pink Salmon Linkage Groups

Number of markers in linkage group	Number of linkage groups	Average size (cM)
2-5	12	27.2
6-10	10	50.3
11-15	8	122.5
16-20	4	204.7
21-25	4	213.2
26-30	0	-----
31-35	1	354.1
36-40	0	-----
41-45	2	532.8
>50	1	470.4

Table 2. Summary of Marker Types on the Pink Salmon Map

Marker type	Total loci	Number assigned	Percent assigned
AFLPs	393	372	95
PINEs	162	157	97
Microsatellites	34	34	100
Allozymes	13	13	100
	---	---	---
Total	602	572	96

[FIGURE 1 in WORD files (fig-1a.doc; fig-1b.doc; fig-1c.doc)]

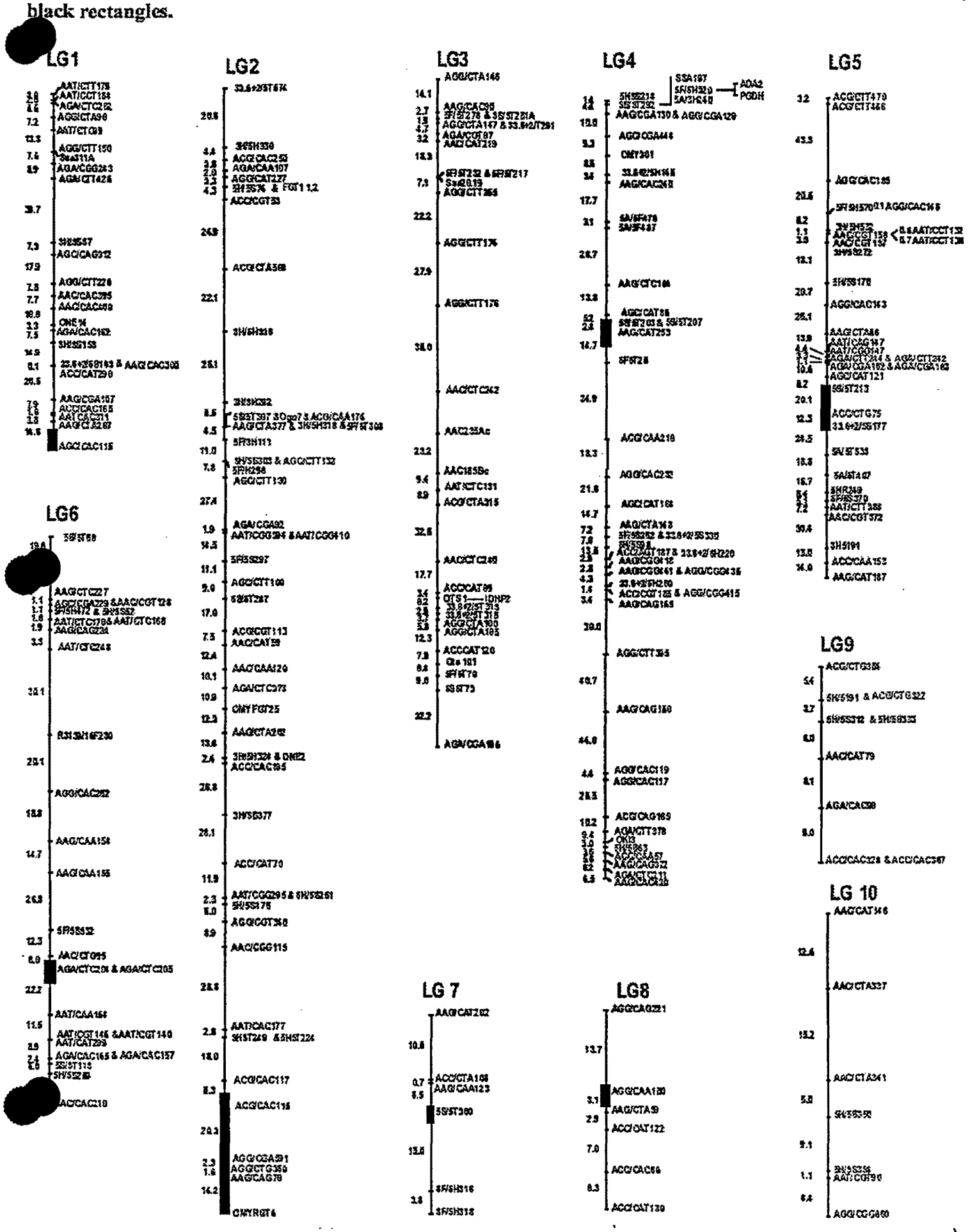
[TABLE 3 in WORD file (table-3.doc)]

Putting "Anchor Loci" on the Map

We are still in the process of placing additional loci on the map to aid in consolidation and to make the map useful to other genetic investigators working with salmonids. In particular, it is important to include common markers that can serve as references between maps from divergent taxa (O'Brien et al. 1993). The primary types of so-called "anchor loci" we have used are allozymes and microsatellites that are currently being used in salmonid population genetic studies, including investigations of pink salmon. We will also map other loci that are available and of special interest and usefulness (e.g., growth hormone loci, Forbes et al. 1994, and the major

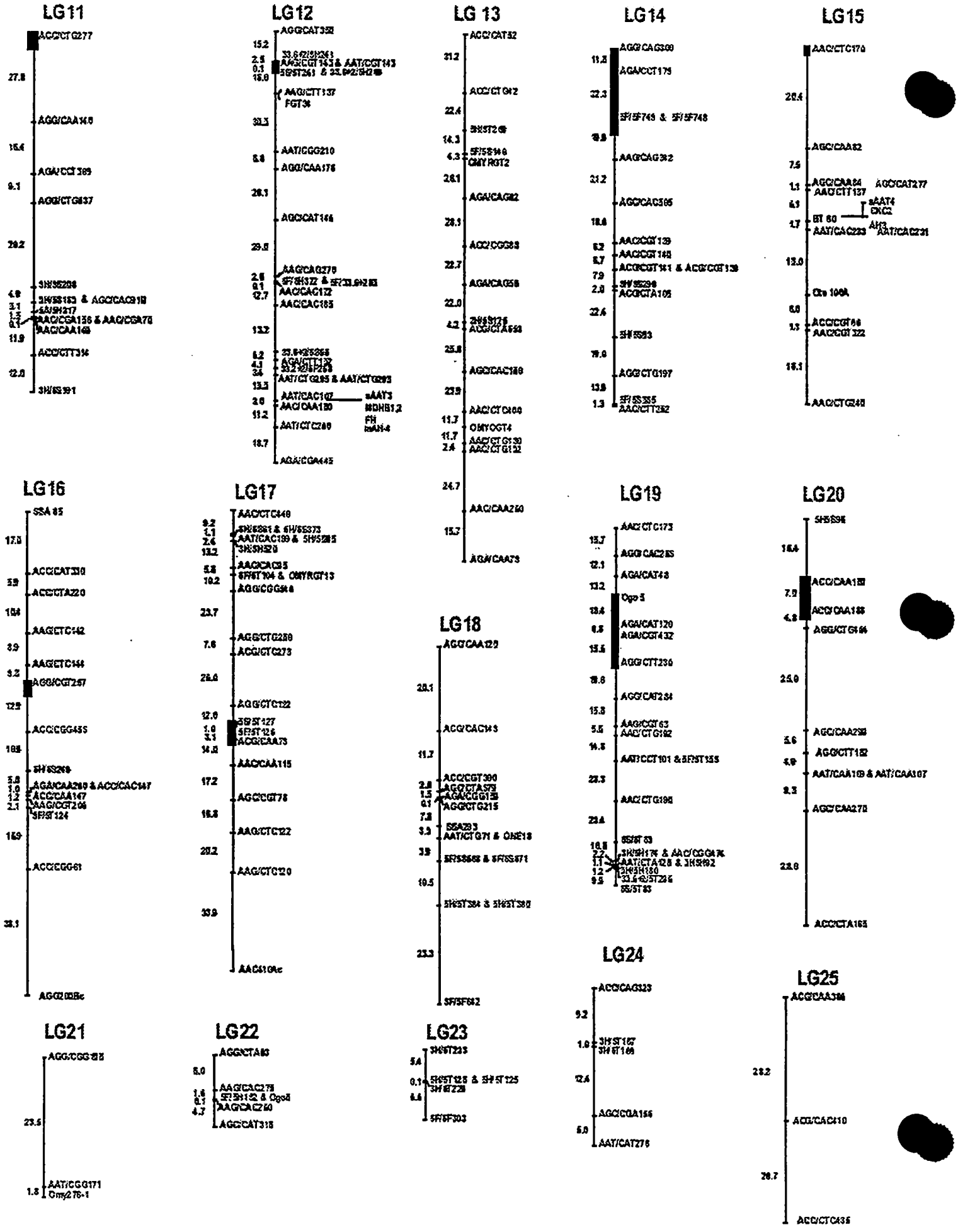
F:91 1/3

Figure 1. Genetic linkage map of pink salmon based on the inheritance of 602 polymorphic loci. Numbers to the left indicate recombination rates (cM). Locus names are to the right. Centromeres are indicated by black rectangles.



EE C

1a


LG11
LG12
LG 13
LG14
LG15
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LG20
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LG25

Figure 1 - continued (b)

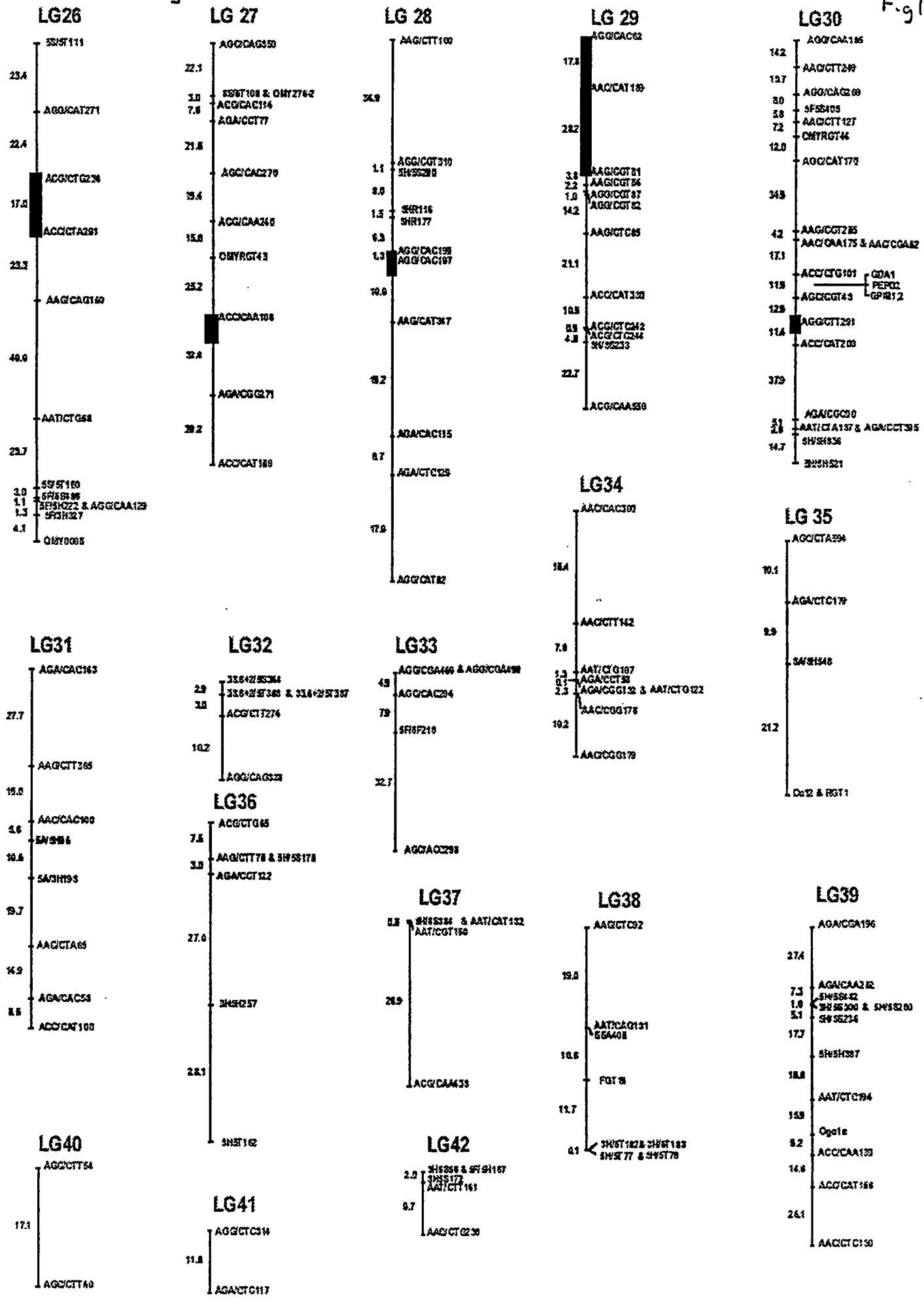

Table 3. Comparison of linkage maps from six teleost fishes. Total number of markers included on the map are provided. Sex refers to which gender the map is based on, F= female and M= male. LOD (log odds) threshold is one of the criteria used for the construction of the map using MapMaker linkage analysis program. The larger the LOD the higher the stringency level for determining linkage.

	Pink Salmon	Zebrafish Shimoda et al. 1999	Rainbow Trout Young et al. 1998	Tilapia Kocher et al. 1998	Zebrafish Johnson et al. 1996	Medaka Wada et al. 1995	Xiphophorus Morizot et al. 1991
Number of Markers	602	2000	476	174	652	170	76
Number of Linkage Groups	42	25	42	30	29	28	17
Number of Chromosomes	26	25	30	22	25	24	24
Sex	F	M & F	M	F	F	M	M & F
Estimated size (cM)	6872	2295	2627	1000-1200	2720	2480	1400-2600
kbp/cM	391	740	913	833-1000	625	323	300
LOD	4	4	3	3	3	3	3

histocompatibility complex, Katagiri et al. 1996; Miller and Withler 1996; Shum et al. 1996). These anchor loci will be used to test for differences in the linkage map between odd- and even-year pink salmon. In addition, we will test for differences in recombination rates, crossover interference, and residual tetrasomic inheritance between males and females (Allendorf and Danzmann 1997).

We have placed 34 microsatellite loci on the map in collaboration with Drs. Roy Danzmann, Moira Ferguson, and Takashi Sakamoto at the University of Guelph in Ontario. These microsatellite loci are found in 17 linkage groups. We have also placed 13 allozyme loci that are polymorphic in Prince William Sound pink salmon (Seeb et al. 1996; Habicht et al. 1998) on the map using gynogenetic-diploids from female 95-103 and several normal diploid families (Table 4) in collaboration with the ADFG Genetics Lab.

Table 4. Summary of linkages in normal diploid families between allozymes and microsatellites

Loci	Fam	Inform. Parent	N	r	Chi-sq (1 df)
sAAT3 - FH	A14	Fem	86	0.337	9.12
sAAT3 - sMDHB1,2	A14	Fem	89	0.112	53.49
sAAT4 - STR60	A104	Fem	21	0.238	5.76
ADA2 - PGDH	A120	Mal	56	0.125	31.50
ADA2 - SSA197	A103	Fem	42	0.024	38.10
	A120	Mal	18	0.111	10.89
CKC2 - STR60	A103	Fem	46	0.348	4.26
FH - MDHB1,2	A14	Fem	86	0.291	15.07
bGALA - G3PDH1	V2	Mal	75	0.346	7.05
GDA1 - PEPD2	A8	Mal	82	0.012	78.05
	A20	Mal	95	0.105	59.21
	A29	Mal	45	0.000	45.00
G3PDH1 - PEPLT	V5	Mal	75	0.240	20.28
GPIB1,2 - PEPD2	V2	Mal	75	0.013	71.05
sIDHP2 - OTS1	A29	Mal	41	0.366	2.95

	A104	Fem	33	0.303	5.12
PGDH - SSA197	A120	Mal	20	0.050	16.20

OBJECTIVES 5 & 6

The completion of a genome map for pink salmon allows us to address important genetic issues related to two other Components of the Pink Salmon Restoration Program. The numerous genetic markers identified in the course of this study will provide greatly increased power and resolution to identify stocks of pink salmon on a very fine scale (Stock Separation and Management). In addition, understanding the process of mutation may help us choose appropriate markers to be used for stock identification. The genetic map also allows us to test for the presence of genes having major effects on traits of importance for the management of pink salmon, and to test for phenotypes associated with specific combinations of multilocus genotypes (Lander and Schork 1994). These genetic markers will be of great value in genetically identifying fish from supplementation programs and detecting their ecological and genetic interactions with wild fish (Supplementation).

This aspect of the research is being performed at the ASLC research facilities. Approximately 50,000 marked fish were released in spring of 1999; surviving individuals will be collected when they return to the facility at sexual maturity in August 2000. A sample of the fish were collected at release and will be analyzed so that their genetic characteristics prior to the marine phase of the life cycle can be compared to the returning adults. We will test for genetic effects on phenotypes of special importance by comparing the genotypes of the released fish with the genotypes of the returning fish. This will allow us to test for genes with a major effect on marine survival. We will test for loci or regions of the genome that have a large effect on phenotypes of interest, so-called quantitative trait loci (QTL's). For example, Jackson et al. (1998) recently have presented evidence for QTL's that affect upper temperature tolerance in rainbow trout linked to two of 24 polymorphic loci that they examined. Mousseau et al. (1998) have used a similar approach to estimate heritabilities for weight, length, and age at sexual maturation in chinook salmon.

Previous work has demonstrated genetic differences between early and late pink salmon, and that differences in run-timing has a genetic basis (McGregor et al. 1998; Smoker et al. manuscript). We will compare the genotypes of fish returning to the facility at different times to test for genes with a major effect on run timing. We will use a suite of genetic markers spread uniformly throughout the genome. Regions of the genome that show major associations with run-timing can then be examined in more detail by comparing additional markers within that region. A similar approach using only 10 protein markers in hatchery rainbow trout revealed several regions of the genome associated with time of spawning (Leary et al. 1989). Sakamoto et al. (1999) have reported similar results on the basis of 54 microsatellite loci.

Karl and Avise (1992) reported concordant patterns of genetic differentiation for mitochondrial DNA and four nuclear DNA loci in the American oyster (*Crassostrea virginica*) along the east coast of North America. In contrast, previous allozyme studies had not detected these genetic differences among these same populations. Karl and Avise concluded that the pattern observed for the DNA markers reflected the historical patterns of isolation and gene flow among these populations while this pattern is obscured in the allozymes because of "balancing selection" at the allozyme loci. Similar results have been reported in the Atlantic cod (Pogson et al. 1995). These results provide an important challenge to the generally accepted utility of

allozyme markers for describing historical patterns and amounts of gene flow between populations. That is, if allozymes are under strong natural selection then they may not provide accurate information about the genetic structure and amount of gene flow among populations.

Restoration Projects 95320D and 96196 have described the genetic population structure in Prince William Sound (PWS) odd- and even-year fish at allozyme loci and mitochondrial DNA (mtDNA) (Seeb et al 1996; Habicht et al. 1998). These studies reported small but statistically significant genetic allele frequency differences among streams, and concluded that pink salmon in PWS should be managed taking into account subpopulation structure rather than as a single panmictic population. As is usually done in such studies, these authors assumed that the genes they examined were selectively neutral (that is, not affected by natural selection). However, the estimates of these authors could be severe overestimates of the actual amount of gene flow if "balancing" selection is maintaining similar frequencies (Karl and Avise 1992; Pogson et al. 1995). That is, there may be much less gene flow among populations than is suggested by these studies.

Zhivotovsky et al. (1994) have reviewed population genetic data of pink salmon and concluded that the interpretations concerning amounts and patterns of gene flow are questionable because even weak natural selection could have a major effect on genetic divergence among populations of pink salmon. A series of papers by Altukhov and his colleagues has provided evidence for phenotypic and fitness effects of genetic variation at allozyme loci in pink salmon (Altukhov 1990; Altukhov et al. 1987, 1989; Dubrova et al. 1995; Kartavtsev 1992). These papers argue that genotypes at allozyme loci have a significant effect on marine survival, growth rate, and several other important factors.

The clearest and perhaps most important effects have been demonstrated on marine survival and growth rates. Pink salmon that are more heterozygous at allozyme loci have greater viability and growth rates than more homozygous individuals (Altukhov et al. 1991; Zhivotovsky et al. 1987; Kartavtsev 1992). Table 5 shows the distribution of individual heterozygosities at four allozyme loci in fry before release into salt water and returning adult spawners in odd-year pink salmon from the Sakhalin Island (Altukhov et al. 1987). We would expect the heterozygosities in fry and adults to be similar if the genotypes at these loci are not associated with survival. The significantly higher heterozygosity in the returning adults (0.619) than in the fry (0.424) indicates that individuals that were more heterozygous at the four loci had greater marine survival.

Altukhov et al. (1991) found a significant positive regression ($r=0.14$; $P<0.01$) between individual heterozygosity at these same four allozyme loci and body length of fry immediately preceding downstream migration from a hatchery on the Sakhalin Island. Kartavtsev (1992) reported a similar relationship in a different experiment with pink salmon from Sakhalin island ($r=0.23$; $P<0.001$). Previous studies with salmonids have found that size has an important effect on survival (Hunt 1969).

Table 5. Distribution of Heterozygosity at Four Allozyme Loci in Pink Salmon from Sakhalin Island

Age-class	Number of het. loci*			Average het.
	0	1	2-4	
Fry	0.620 (559)	0.336 (302)	0.044 (40)	0.424 (901)
Adults	0.495 (300)	0.391 (237)	0.144 (69)	0.619 (606)

χ^2 =37.3
d.f. = 2
P<0.001

* values are the frequencies (and number) of individuals with the indicated number of heterozygous loci

Similar results have been reported in other salmonid species for many phenotypes of evolutionary importance (e.g., developmental rate, egg size, and disease resistance; reviewed by Ferguson 1992). Positive associations between heterozygosity at allozyme loci and important phenotypic characters, such as growth rate, survival, fertility, disease resistance, developmental rate, and developmental stability, have been described in many organisms (reviewed by Zouros and Foltz 1986; Allendorf and Leary 1986).

The mechanism underlying these associations remains unknown. The most likely possible explanations are (1) the associations are the consequence of heterozygosity at the loci examined, or (2) the loci examined may be in linkage disequilibrium with other loci that affect the traits being studied (associative overdominance; Leary et al. 1987).

It has been argued that these relationships between multiple locus heterozygosity and phenotypes have been found with allozymes because these loci are important in ATP production and protein catabolism (Koehn et al. 1988). We propose to distinguish between these hypotheses by using the linkage map to compare the effects of different markers on marine survival and other traits. If the enzyme loci themselves are responsible for this effect, then we would expect to find an association between enzyme genotypes and survival, but not between genotypes at DNA markers spread throughout the nuclear genome. However, if we find a similar association using DNA markers, this would suggest that the effect is due to chromosomal segments and not the enzyme loci themselves.

We believe that it is unlikely that the enzyme loci themselves are responsible for the observed relationships. Nevertheless, regardless of the underlying mechanisms of these associations, even weak heterozygous advantage (or associative overdominance) would act to maintain similar allele frequencies in different populations in the absence of significant gene flow (Allendorf 1983). This could cause a large overestimation of the actual amount of gene flow among PWS pink salmon populations. For example, just a 10% selective advantage of heterozygotes will cause a 10-fold over estimation of the amount of migration in the case where

local populations have an effective size of 100 and an average 0.5 migrants per generation (Allendorf 1983). Altukhov et al. (1987) have estimated an average selective advantage of approximately 25% at four allozyme loci in pink salmon.

There is a series of questions that we will ask in this aspect of the research. The primary question is are there regions of the genome that have a significant effect on survival during the marine phase of the life cycle? Secondarily, we will ask if allozyme markers tend to occur in those regions that affect survival. We will also determine if selection favors heterozygotes.

Marine Survival and Fitness Experiment: 1998 cohort

In August 1998, 150 (75 male and 75 female) mature pink salmon were collected from Likes Creek, Resurrection Bay, and transported to the ASLC for controlled matings. We made 75 families of full-sibs by crossing one male and one female. One hundred progeny from each family were collected for inheritance analysis. We then selected 50 of these families on the basis of egg number and survival during incubation for the release experiment. These families were pooled together into a single tank in March shortly after hatching. In May 1999, approximately 1,500 progeny from each of these 50 single-pair mating families were released from the ASLC facility.

We sampled 1,000 progeny when the fry were released to test for a relationship between multiple locus heterozygosity, length, and condition factor both within and between families. We will sex the fish using a sex-linked PCR-marker (Spruell et al. 1999) to test if the morphological differences in length and fluctuating asymmetry are already present at this early age. Surviving progeny are expected to return in August 2000. Given an anticipated return rate of 2%, a total of 1,000-2,000 individuals are expected to be recovered for genetic and morphological analyses (approximately 30 fish per family).

This is a powerful experimental design that will allow us to measure a multitude of parameters for the first time with pink salmon or any salmonid fish. The most powerful aspect of this experiment will be the capability of measuring fitness for loci spread throughout the genome. In the case of males, fitness will be estimated by survivorship (viability) from egg to return at sexual maturity. In the case of females, we will use both survivorship and the number of eggs produced so that we can take into account both viability and fecundity. We will also be able to estimate the heritabilities of a variety of traits (e.g., size at sexual maturity) by parent-offspring regression (Mousseau et al. 1998; Leary et al. 1985). Comparison of genotypes during the freshwater phase of their life cycle and in this same cohort when they return as adults will allow a powerful test for regions of the genome that affect survival. The failure to detect differential survival would provide strong evidence supporting the assumption of selective neutrality of genetic markers used to describe population structure.

We believe that we will find some regions of the genome associated with differential survival. This experimental design will allow us to determine what proportion of the genome is affected and how strong the effect is. Also, we will be able to test if this differential survival is associated with regions of the genome marked by allozyme loci.

Marine Survival and Fitness Experiment: 1999 cohort

We repeated this experiment with odd-year pink salmon in August 1999. We collected 68 adults (34 females and 34 males) from Likes Creek, and plan to release their progeny from the ASLC in May 2000. This cohort should return in summer of 2001. We used a different experimental mating scheme with these fish. Each male and each female was crossed with two individuals in a series of 2 x 2 diallele crosses (Figure 2). The ability to compare half- and full-sibs will allow us to perform more complicated quantitative genetic analysis of the returning fish. We initially had planned to use this design the first year as well, but we used the full-sib design because of time constraints in performing the crosses and because we were concerned that splitting the eggs from each female into two families would result in too few fish returning per family to perform meaningful statistical analysis. However, we modified this design with the 1999 cohort because of our experience and success with the 1998 cohort.

[FIGURE 2 in WORD file (fig-2.doc)]

Mutation Analysis

Our results have provided exciting and important information about the mutation process in microsatellites. Our experimental design depends upon being able to place returning adults into their correct family on the basis of their multiple-locus genotype. We have tested this by an examination of 10 progeny from each of the 50 families that were released in spring of 1998 at 10 loci (Table 6; 8 microsatellites, *GH-2* and *MHC-αI*). This allowed us to test the inheritance of the genotypes identified in the adults and to ensure that we will be able to assign returning progeny to family. We detected some progeny genotypes that appeared to result from mutation events (Figure 3). To examine this possibility in more detail we have begun to examine the genotypes of additional progeny in additional families (98-15, 98-19, and 98-26).

We have observed a total 28 of progeny that have genotypes at two of the eight microsatellite loci that are best explained as being the results of mutation events (Table 7). These 28 progeny all have genotypes at the other nine loci that are compatible with their parents; in addition, one allele at the locus containing the putative mutation in each of these progeny is compatible with either their mother or father. Thus, all of these individuals appear to possess *de novo* mutations at these loci. One of the families (98-26) used for screening additional individuals was chosen because it had a high mutation rate in our initial screen. Therefore, our estimates of mutation rates are based upon our initial screening of 10 individuals per family. We initially saw 14 mutations at *SSA408* in a total of 467 individuals (Table 7). Each individual inherits two gene copies of each gene. Therefore, our estimate of mutation rate at *SSA408* is 14/(467 x 2)=0.015. Similarly, we saw 8 mutations in 488 individuals at *OGO1c* for a mutation rate of 0.008.

[FIGURE 3 in WORD file (fig-3.doc)]

[TABLES 6 and 7 in WORD files (table-6.doc; table-7.doc]

We have observed two different types of germline mutations: singletons and clustered

Figure 2. Diagram of our half-sib family experimental design. Numbers across the top represent females, numbers down the side represent males. The squares represent individuals used to make each family.

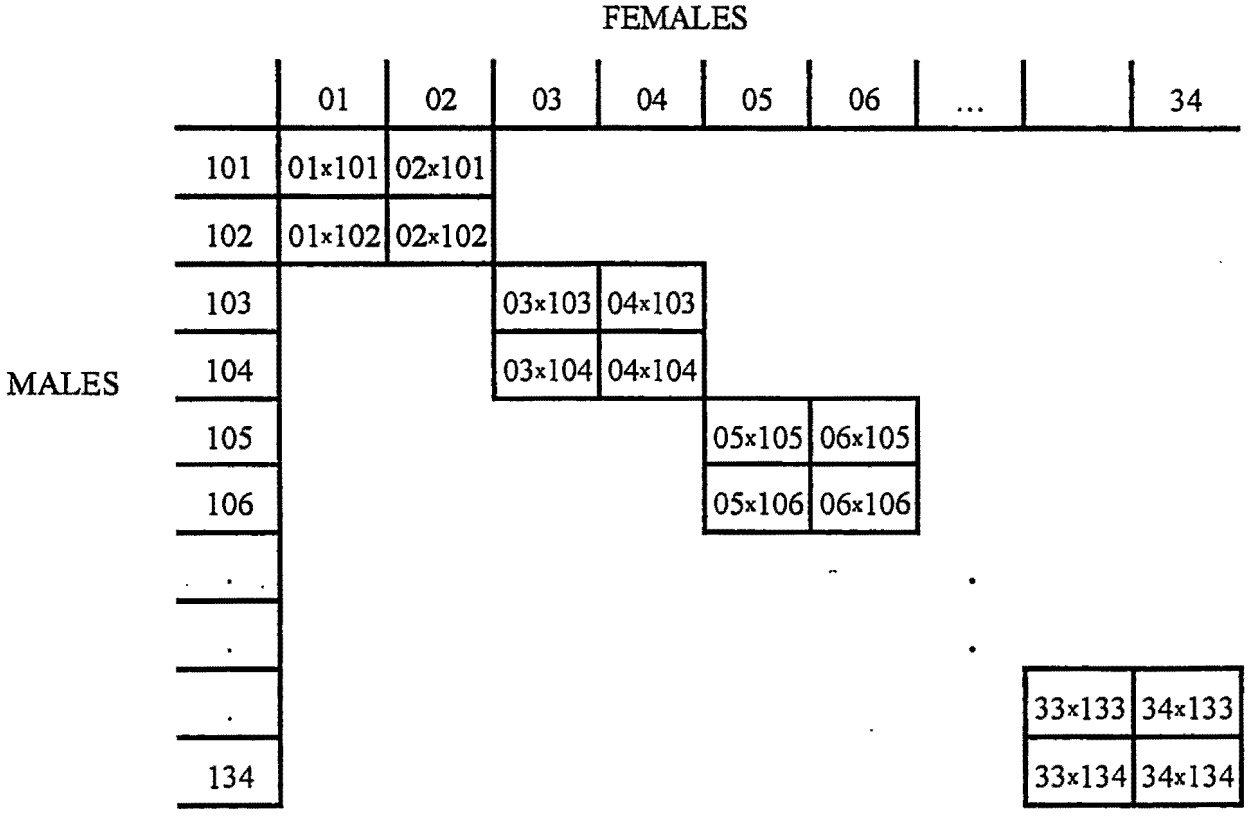

Figure 3. PCR products from *SSA408* in family 98-23 electrophoresed in a 7% polyacrylamide gel. The first two lanes on the left show products from the mother and father. The next ten lanes show products amplified from their progeny. Numbers at the right represent the size of the parental alleles in base pairs (bp). Arrows indicate individuals (7 and 9) with a mutant allele (370 bp). Size ladder is shown at the far right.

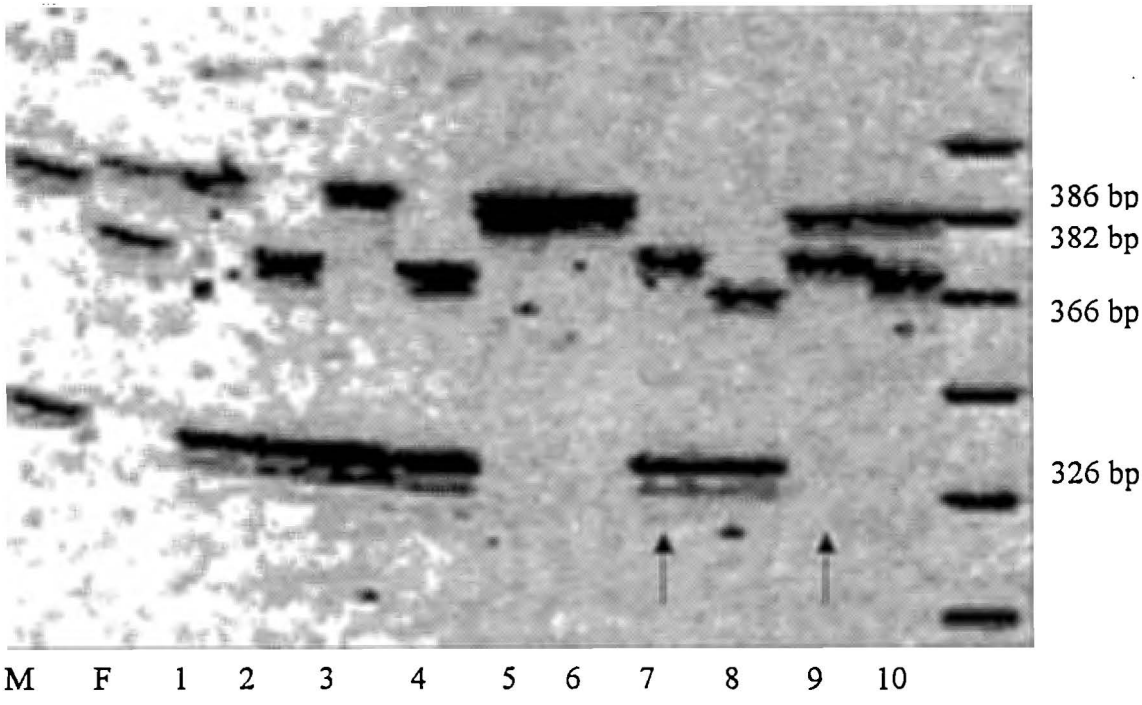

Table 6. Loci amplified in 50 parent pairs analyzed for the marine survival and fitness experiment. The first two loci are genes of known function. The remaining 11 loci are microsatellites. Number of alleles and expected heterozygosizy (H_e) are reported. The first eight microsatellite loci were amplified in the parent pairs and at least 10 of their progeny. See text for mutation rate (μ) calculation. The last three loci were amplified only in the parents. Gene-centromere distances (y) were calculated using data from gynogenetic diploids (Lindner et al. 1999). Missing data are represented by ---.

Locus	# of Alleles	H_e	μ	y
GH-2	2	0.270	0	---
MHC-α1	2 (+null)	0.497	0	0.43
OGO1c	77	0.983	0.008	0.19
OGO8	17	0.334	0	1.00
OMY301	21	0.856	0	0.79
ONEμ3	3	0.507	0	0.98
OTS1	15	0.829	0	0.27
SSA20.19-1	2	0.058	0	1.00
SSA20.19-2	3	0.307	0	---
SSA408	49	0.972	0.015	0.17
OCL2	6	0.380	---	0.68
SSA14	5	0.096	---	---
μSAT60-2	5	0.257	---	0.58

Table 7. Mutations observed at two microsatellite loci. Numbers in ( ) represent individuals analyzed and mutations detected in addition to the original screening.

	SSA408		*OGO1c*	
Family	#Individuals	#Mutations	#Individuals	#Mutations
98-1	8	0	10	0
98-4	8	0	10	0
98-5	9	0	10	0
98-6	9	0	10	0
98-7	8	0	10	0
98-9	9	0	10	0
98-10	10	0	10	0
98-11	10	0	10	0
98-12	10	0	10	0
98-13	9	0	10	0
98-14	10	0	10	0
98-15	10 (33)	0 (1)	10	0
98-19	10 (35)	1 (0)	10	0
98-20	10	0	10	0
98-21	10	0	10	0
98-22	9	1	10	0
98-23	10	2	10	0
98-25	10	0	10	0
98-26	10 (39)	4 (5)	10	0
98-27	9	0	10	0
98-28	10	0	9	0
98-32	10	0	9	0
98-34	9	0	10	1
98-35	9	0	10	0
98-38	9	0	10	0
98-39	10	0	9	0
98-40	10	0	10	4
98-41	10	0	10	0
98-43	9	0	10	0
98-44	9	0	9	1
98-45	10	0	10	0
98-46	8	0	9	0
98-49	9	0	9	0
98-50	8	0	10	0
98-51	10	0	10	1
98-53	9	0	10	0
98-58	9	0	10	0
98-60	10	0	10	0
98-61	10	0	10	0
98-63	9	0	10	0
98-64	8	0	10	1
98-65	10	6	10	0
98-67	9	0	10	0
98-68	10	0	9	0
98-69	9	0	10	0
98-71	9	0	10	0
98-72	10	0	10	0
98-73	9	0	10	0
98-74	10	0	6	0
98-75	8	0	9	0
Total	467 (107)	14 (6)	488	8

mutations (Woodruff et al. 1996). Singletons are mutations that occur in late meiosis and are transmitted to a single gamete (Figure 4). Clustered mutations occur during premeiotic replication of the germline and thus are expected to be transmitted to approximately one-half of all progeny.

We have observed 18 singleton mutations at these two loci in nine different families (Tables 7 and 8). Both of these loci are tetranucleotide repeats, and all of the putative mutant alleles are just one repeat-unit (4 base pairs) away from an allele in the parent that has transmitted the mutant allele. In addition, 17 of the 18 putative mutant alleles detected appear to be one repeat-unit longer than their likely progenitors, whereas one mutant allele was one repeat-unit shorter (Table 8). The single step change with a bias towards increasing the number of repeats is consistent with the theory that microsatellite mutations result from DNA polymerase strand slippage (Levinson and Gutman 1987, Weber and Wong 1993). Banks et al. (1999) found a single mutation in their study of the inheritance of microsatellites in chinook salmon that was a gain of a single repeat-unit. The mutations we detected appear to be randomly distributed among families with a single major exception. Nine of the singleton mutations were at *SSA408* in family 98-26. Eight of these nine mutations appear to be a one repeat-unit gain at the same allele (*316*). Thus, this appears to be a so-called "hypermutable" allele that have been reported in other species (Schlötterer et al. 1998).

[FIGURE 4 in WORD file (fig-4.doc)]

[TABLE 8 in WORD file (table-8.doc)]

Clustered mutations were observed in family 98-65 at *SSA408* and in 98-40 at *OGO1c* (Table 8). In both cases, it appears that an allele in the father mutated before meiosis so that a mutant allele was transmitted to approximately one-half of all progeny. Both of these mutations increased allele size by multiple repeat-units. The mutant allele at *SSA408* in 98-65 appears to be a gain of 3 repeat-units, and the mutant allele at *OGO1c* in 98-40 appears to be a gain of approximately 15 repeat-units. Thus all of the singleton mutations were single repeat-unit changes while both clustered mutations were larger. Garza et al. (1995) have suggested that such larger mutations may be due to a different mutational mechanism, such as unequal crossover rather than strand slippage. Our linkage map would allow us to test for such differences by looking for recombination events coupled with the production of mutations in specific regions. There is also a suggestion in Table 6 that microsatellite loci near the centromere may have more genetic variation (alleles and heterozygosity). This raises the possibility that centromeric microsatellite loci have higher mutation rates.

These results have important significance for the use of microsatellite loci in analyzing genetic population structure. The process of mutation is expected to have a substantial effect on the amount and pattern of genetic divergence among populations if the mutation rate approaches the rate of migration among populations (see discussion in Allendorf and Seeb 2000). We detected mutations only at the two loci that have the most alleles in the parental population: *OGO1c* and *SSA408* (Table 6). Woodruff et al. (1996) have argued that clustered mutations "may cause us to reconsider many of the fundamental relationships on which population genetic theory is based". Jones et al. (1999) have reported cluster mutations at microsatellite loci in the

Figure 4. Schematic of cell lineages during ontogeny (modified from Woodruff et al. 1996). Mutations are denoted by X. (a) A mutation arises before meiosis and is replicated into a cluster of copies in multiple gametes; (b) a mutation arises late in meiosis in a single gametic cell.

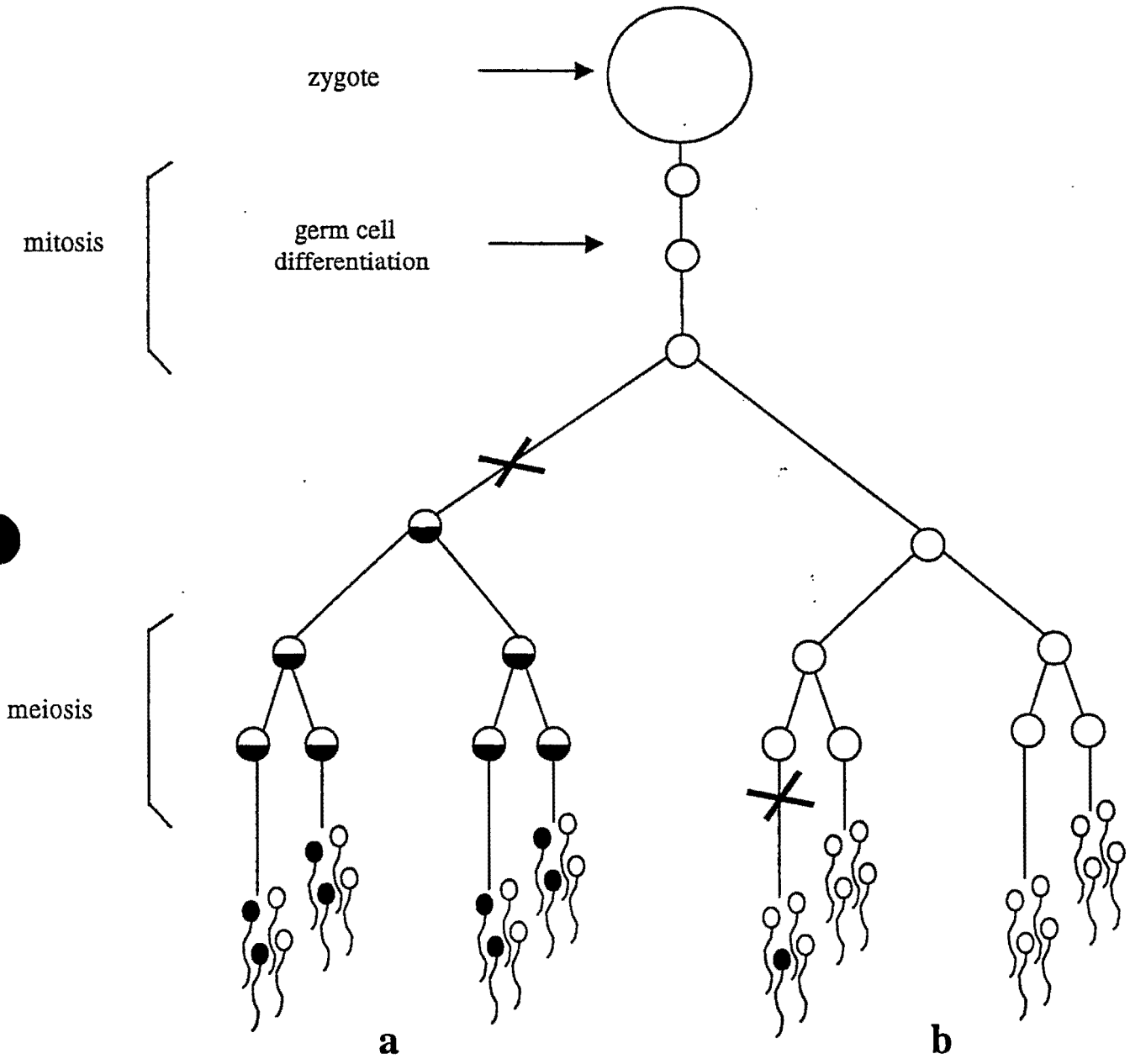

Table 8. Pattern of mutations observed in 1998 cohort families. Parent genotypes are reported with the underlined allele as the most likely progenitor of the mutant allele. Progeny genotypes are summarized with the putative mutant allele in bold followed by the number observed (n).

Locus	Family	Dam	Sire	Progeny Genotypes							Total
SSA408		a/b	c/d	a/c	a/d	b/c	b/d	genotypes not matching parents (#)			
	98-15	334/382	322/~~370~~	12	9	9	12	334/**374** (1)			43
	98-19	~~338~~/350	378/404	15	12	8	9	**342**/404 (1)			45
	98-22	334/404	~~350~~/366	4	1	1	2	334/**354** (1)			9
	98-23	326/382	~~366~~/386	3	2	1	2	326/**370** (1)	382/**370** (1)		10
	98-26	~~316~~/404	312/~~450~~	9	12	12	7	**320**/450 (3)	**320**/312 (5)	316/**454** (1)	49
	98-65	330/354	330/~~464~~	2	0	2	0	330/**476**(1)	354/**476**(5)		10
OGO1c											
	98-34	~~350~~/450	309/346	3	1	3	2	**354**/346 (1)			10
	98-40	277/360	360/~~400~~	3	0	3	0	277/**460**(1)	360/**460**(3)		10
	98-44	342/350	408/~~474~~	1	1	3	3	342/**478** (1)			9
	98-51	295/366	303/~~362~~	1	2	4	2	295/**366** (1)			10
		a/a	c/d								
	98-64	348/348	309/~~448~~	5	4	0	0	348/**444** (1)			10

pipefish (*Syngnathus typhle*). Empirical data from Drosophila suggest that mutation clusters may account for 20-50% of all new mutations (Woodruff et al. 1996). Cluster mutations account for 45% (10/22) of the new mutations that we detected in our initial screen of 10 individuals from each family at both loci (Table 7).

We have begun writing a paper for submission to Molecular Ecology that describes the rate and pattern of mutations that we have observed to date. We will obtain more data on mutations when we genotype and place returning fish into their families of origin.

Assignment of Progeny to Family

We evaluated our ability to assign progeny genetically to the correct family by analyzing the genotypes of the parents and 10 progeny from each of the 50 families from the 1998 cohort released in spring 1999. We used the computer program ProbMax2 (Danzmann et al. 1997) to assign these individuals into families based on their multiple locus genotypes. Using the first ten loci in Table 6, all individuals were assigned to their correct parents except for those individuals that carried the mutations described above. All individuals were placed in their correct family if mutations were taken into account.

Our analysis of ten DNA loci in the 1998 brood year families used in the experimental release for the marine survival and fitness experiment indicates that we have selected loci that encompass a broad range of variability (see Table 6). For the purpose of parentage assignment, highly variable loci are particularly useful in that they provide greater discriminatory power than less variable loci. However, our data suggest that they are also more mutable (Table 6), which can seriously confound parentage analysis. In addition, we have found that the highly variable loci tend to be more difficult to type accurately. Thus, we expected that using a combination of high and low variability markers would be optimal for parentage assignment. We found that by using the combination of *OGO1c*, *SSA20.19-1*, *SSA20.19-2*, and *SSA408*, we could accurately and unambiguously assign parentage to all of the progeny for which we had genotypes, if we took mutations into account.

This is an important finding because it suggests that we will be able to rapidly genotype and assign returning individuals to families in August. This will be critical for the selection of appropriate parents to use for our experimental crosses, which must be performed within a few days of the adults returning to spawn. We hope to mate full-sibs from the 1998 cohort to test for effects of inbreeding on marine survival and other life history traits (e.g., survival and body size during early life history stages). Hitachi Genetic Systems has agreed to set up a fluorescent scanner at the ASLC for our use during the period of the 1998 cohort return. The use of this machine will allow us to quickly and efficiently genotype the returning fish at the ASLC. Parentage will be determined on the basis of these genotypes and experimental crosses will be made within two or three days of sampling the adults.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

The ADFG Genetics Lab is no longer funded to assist us in the work at the ASLC. Therefore, we are currently doing all of the allozyme analysis at the University of Montana.

SCHEDULE

A. Measurable Project Tasks for FY 01 (1 Oct 00 - 30 Sep 01)

1 Oct 00 - 31 Dec 00: Continue genetic analyses of fry from 1999 cohort sampled at time of release from the ASLC.

1 Oct 00 - 31 Dec 00: Perform morphological analysis of adults from 1998 cohort that return to the ASLC.

1 Oct 00 - 30 May 01: Rear experimental progeny from 2000 cohort at ASLC.

1 Oct 00 - 31 July 01: Perform genetic analyses of adults from 1998 cohort that return to the ASLC.

1 Oct 00 - 30 Sept 01: Continue genetic analyses of microsatellite mutations in 1998 and 1999 cohorts.

1 Oct 00 - 30 Sep 01: Continue morphological and genetic analyses of returning sexually mature fish from the 1999 cohort.

B. Project Milestones and Endpoints

Objective 1: This objective has been completed.

Objective 2: This objective has been completed.

Objective 3: This objective will not be pursued.

Objective 4: This objective will not be pursued.

Objective 5: This objective will be completed by the end of year 8.

Objective 6: This objective will be completed by the end of year 8.

C. Completion Date

We initially proposed to continue this work for five years. However, our release experiments were delayed until the ASLC facilities were available. The 1998 cohort fish released in the spring of 1999 will return at the end of year five, and the 1999 cohort fish will return at the end of year six. Genetic analysis should be completed by the end of year seven and data analysis and publications completed by the end of year eight.

PUBLICATIONS AND REPORTS

Allendorf, F. W., P. Spruell, K. L. Knudsen, K. R. Lindner and K. L. Pilgrim. 1997. Construction of a Linkage Map for the Pink Salmon Genome, *Exxon Valdez* Oil Spill Restoration Project Annual Report (Restoration Project 97190), University of Montana, Missoula, Montana.

Allendorf, F. W., P. Spruell, K. L. Knudsen, K. R. Lindner, D.J. Reedy, and K. L. Pilgrim. 1998. Construction of a Linkage Map for the Pink Salmon Genome, *Exxon Valdez* Oil Spill Restoration Project Annual Report (Restoration Project 98190), University of Montana, Missoula, Montana.

Allendorf, F. W., P. Spruell, K. L. Knudsen, and K. R. Lindner. 1999. Construction of a Linkage Map for the Pink Salmon Genome, *Exxon Valdez* Oil Spill Restoration Project Annual Report (Restoration Project 99190), University of Montana, Missoula, Montana.

Spruell, P., B.A. Greene, C. Habicht, K.L. Knudsen, K.R. Lindner, J.B. Olsen, K.L. Pilgrim, G.K. Sage, J.E. Seeb, and F.W. Allendorf. 1999. Inheritance of nuclear DNA markers in gynogenetic haploid pink salmon (*Oncorhynchus gorbuscha*). Journal of Heredity 90:289-296.

Lindner, K.R., J. E. Seeb, C. Habicht, K.L. Knudsen, E. Kretschmer, D. J. Reedy, P. Spruell, and F. W. Allendorf. In press. Gene-centromere mapping of 312 loci in pink salmon by half-tetrad analysis. Genome.

Lindner, K.R., P. Spruell, C. Habicht, J. E. Seeb, H. Zhao, and F. W. Allendorf. In preparation. Estimation of chiasma interference and construction of a linkage map for pink salmon. To be submitted to Genetics.

Steinberg, L.K., K. R. Lindner, A. E. Maxwell, and F. W. Allendorf. In preparation. Rate and pattern of mutation at microsatellite loci in pink salmon. To be submitted to Molecular Ecology.

PROFESSIONAL CONFERENCES

We anticipate presenting our results at professional and scientific meetings. We plan to attend the Plant & Animal Genome Mapping Meeting in San Diego in January.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This work has been done in collaboration with James E. Seeb, Principal Geneticist, ADFG. The inheritance experiments were performed in coordination with the project Oil-Related Embryo Mortalities (Restoration Study \191A). Dr. Seeb is no longer funded to collaborate with us in this Restoration Study.

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

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

The changes in this proposal reflect the discontinuation of Restoration Study \191A, and the decision not to fund our ADFG collaborators on this project. We have had to increase our budget by one full-time person to perform all of the allozyme analysis and for increased travel. We have also expanded our analysis of mutations because of the exciting results of the last year.

PROPOSED PRINCIPAL INVESTIGATOR

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Revision 7-7-00
Approved 8-3-00

2001 EXXON VALDEZ TRUST COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FY 2000	Proposed FY 2001
Personnel		$0.0
Travel		$0.0
Contractual		$223.5
Commodities		$0.0
Equipment		$0.0
Subtotal	$0.0	$223.5
General Administration		$15.6
Project Total	$331.0	$239.1
Full-time Equivalents (FTE)		3.2
Other Resources		

LONG RANGE FUNDING REQUIREMENTS					
		Estimated FY 2001	Estimated FY 2002		
			$225,000.0		

Dollar amounts are shown in thousands of dollars.

Comments:

FY01

Prepared:
7-Jul-00

Project Number: 01190
Project Title: Construction of a Linkage Map for the Pink Salmon Genome
Name: University of Montana
Agency: Alaska Department of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

Revision 7-7-00

2000 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET
October 1, 1999 - September 30, 2000

Budget Category:	Authorized FY 2000	Proposed FY 2001
Personnel	$123.3	$132.0
Travel	$12.6	$14.1
Contractual	$0.0	$0.0
Commodities	$36.5	$35.5
Equipment	$0.0	$0.0
Subtotal	$172.4	$181.6
Indirect	$39.3	$41.9
Project Total	$211.7	$223.5
Full-time Equivalents (FTE)	2.7	3.2
Other Resources		

LONG RANGE FUNDING REQUIREMENTS					
			Estimated FY 2002		
			$225,000.0		

Dollar amounts are shown in thousands of dollars.

Comments:

Indirect cost is based on the University of Montana rate of 43.7% of salaries and wages.

Travel costs are included to attend the Trustee Council Annual Restoration Workshop.

Travel costs are included to allow attendance at the Annual Plant and Animal Genome Mapping Meeting in San Diego.

Travel costs include trips from Missoula to the ASLC in Seward.

Costs are included to cover writing the annual report, manuscript preparation.

Two months of personnel time is included for manuscript and annual report preparation.

$223.5
+ ADF&G GA 15.6
$239.1

FY01

Prepared: July, 2000

Project Number: 01190
Project Title: Construction of a Linkage Map for the Pink Salmon Genome
Name: University of Montana

FORM 4A
Non-Trustee
SUMMARY

2000 EXXON VALDEZ TRUS' :OUNCIL PROJECT BUDGET
October 1, 1999 - September 30, 2000

Personnel Costs:				Months	Monthly		Proposed
	Name	Position Description		Budgeted	Costs	Overtime	FY 2001
	F. Allendorf	Project Director		2.0	11.4		22.8
	P. Spruell	Research Scientist		2.0	4.2		8.4
	K. Lindner	Research Specialist		12.0	3.4		40.8
	K. Knudsen	Research Specialist		4.0	4.2		16.8
	Vacant	Laboratory Assistant		12.0	2.4		28.8
	Vacant	Laboratory Assistant		6.0	2.4		14.4
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		38.0	28.0	0.0	
						Personnel Total	$132.0

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FY 2001
						0.0
	Missoula to Anchorage for the Trustee Council Workshop	0.7	1	3	0.1	1.0
						0.0
	Missoula to Seward to shock and count eggs in November.	0.7	1	4	0.1	1.1
						0.0
	Missoula to Seward to sort and pond fry at the ASLC in May.	0.7	2	4	0.1	1.8
						0.0
	Missoula to Seward to collect and sample returning 1999 cohort.	0.7	4	64	0.1	9.2
						0.0
	Travel to a national meeting to present results.	0.7	1	3	0.1	1.0
						0.0
					Travel Total	$14.1

FY01

Prepared: July, 2000

Project Number: 01190
Project Title: Construction of a Linkage Map for the Pink Salmon Genome
Name: University of Montana

FORM 4B
Personnel
& Travel
DETAIL

2000 EXXON VALDEZ TRUS' OUNCIL PROJECT BUDGET
October 1, 1999 - September 30, 2000

Contractual Costs:	Proposed FY 2001
Description	
Contractual Total	$0.0

Commodities Costs:	Proposed FY 2001
Description	
Materials and supplies for microsatellite and allozyme analysis.	21.6
FMBIO 100 fluorescent scanner service and maintenance contract.	7.7
Equipment repair and maintenance.	5.5
Communications	0.7
Commodities Total	$35.5

FY01

Prepared: July, 2000

Project Number: 01190
Project Title: Construction of a Linkage Map for the Pink Salmon Genome
Name: University of Montana

FORM 4B
Contractual & Commodities DETAIL

2000 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET
October 1, 1999 - September 30, 2000

New Equipment Purchases:	Number of Units	Unit Price	Proposed FY 2001
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		
Htachi FMBIO 100 Fluorescent Imaging Scanner	1	

FY01

Prepared: July, 2000

Project Number: 01190
Project Title: Construction of a Linkage Map for the Pink Salmon Genome
Name: University of Montana

FORM 4B
Equipment
DETAIL

FY 01 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET
October 1, 2000 - September 30, 2001

Budget Category:	Authorized FFY 2000	Proposed FFY 2001
Personnel		$0.0
Travel		$0.0
Contractual		$151.2
Commodities		$0.0
Equipment		$0.0
Subtotal		$151.2
General Administration		$10.6
Project Total		$161.8
Full-time Equivalents (FTE)		

LONG RANGE FUNDING REQUIREMENTS

Estimated FFY 2002

Dollar amounts are shown in thousands of dollars.

Other Resources

Comments:

2001

Project Number: 01190
Project Title: Alaska SeaLife Center Bench Fees
Agency: ADF&G

FORM 3A
SUMMARY

Revision 7-12-00
Approved TC 8-3-00

Pristane Monitoring in Mussels

Project Number:	01195
Restoration Category:	Research and Monitoring
Proposer:	Jeffrey W. Short and Patricia M. Harris NMFS, Auke Bay Laboratory ABL Program Manager: Dr. Stan Rice NOAA Program Manager: Bruce Wright
Lead Trustee Agency:	NOAA
Cooperating Agencies:	None
Alaska Sea Life Center:	No
Duration:	Indefinite
Cost FY01:	$ 55,000
Cost FY02:	$ 55,000
Cost FY03:	$ 55,000
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pink Salmon

ABSTRACT

This project has focused on elucidating the transport mechanism of pristane from *Neocalanus ssp* copepods into mussels in PWS for the previous 5 years. Comparison of pristane concentration increases in mussels near hatcheries with marine survival of hatchery pink salmon shows a significant correlation, indicating that pristane monitoring is a candidate forecasting method for marine survival of these salmon. This project will now focus on (1) assessing the reliability of these forecasts, (2) examining whether survival forecasts for hatchery pink salmon may be extended to wild stocks and to other salmonids, (3) development of a formal model for the expected relationship between pristane concentrations in mussels and marine survival of hatchery pink salmon, and (4) further evaluation of the physical and biological features of the ecosystem that modulate the production of pristane and its accumulation by mussels.

INTRODUCTION

Predicting recruitment is a fundamental goal of fisheries management, but an adequate understanding of the factors modulating recruitment are rarely achieved. This project has been funded in the hope that it would elucidate recruitment factors during the early marine phase of salmon and herring in Prince William Sound (PWS). Project results, augmented by agency-sponsored research, indicate that monitoring pristane in mussels may provide a basis for predicting marine survival of pink salmon, which might also be applicable to other salmon species (especially chum salmon). This project is now ready to advance to a validation stage, comparing pink salmon survival forecasts with actual returns, to assess reliability. If validation is successful, fisheries managers will have a new tool to improve salmon and ecosystem management in PWS.

Comparison of pristane accumulated by mussels near PWS hatcheries following mass-releases of juvenile pink salmon with subsequent marine survival of the released salmon has shown a significant and potentially useful correlation. Prince William Sound Aquaculture Corporation (PWSAC) hatcheries in PWS have adopted a strategy of releasing juvenile salmon *en masse* in recent years to minimize predation. Numbers of released juveniles usually range from 20 to more than 100 million per release. Released juveniles immediately begin searching for adequate prey, and they become increasingly vulnerable to predation until prey adequate to support rapid growth are located.

By far the most available prey during spring in PWS are *Neocalanus* copepods, which contain pristane concentrations approaching 1% (dry weight basis). High-density patches of these copepods accumulate near shorelines in response to wind-driven and other surface currents, and juvenile pink salmon remain close to shorelines during their first few weeks of marine residence searching for prey. Abundant fecal material rich in pristane is produced when large numbers of released pink salmon encounter concentrated near-shore patches of copepods. This pristane-laden fecal material is readily incorporated by mussels, so monitoring the increase of pristane concentrations in mussels near PWSAC hatcheries 2 to 3 weeks following releases of juveniles provides an indication that the released fish have located adequate prey. Conversely, failure to detect pristane increases in mussels anywhere within 25 km of hatcheries following a mass release strongly suggests low prey availability, leading to high vulnerability to piscivorous predators.

Most aspects of the transport pathway linking pristane generation in copepods to consumption by mussels have now been validated by field and laboratory experiments. Field studies have demonstrated that high *Neocalanus* copepod abundance alone does not result in much pristane accumulation by mussels, hence direct incorporation of pristane dissolved into seawater from copepods, or of pristane in feces produced by these copepods, are negligible pathways to mussels. Other zooplanktivorous fishes may also produce pristane-laden feces during Spring, but are unlikely to cause significant confounding because compared with pink salmon they are not as

abundant near hatcheries just after releases of pink salmon, and other these zooplanktivorous fishes are less closely associated with the shoreline. Shoreline association is important because both field and laboratory studies showed that effective incorporation of pristane by mussels requires production of feces just above mussel beds at higher tidal stages. Laboratory studies also showed that mussels accumulate pristane within hours when exposed to pristane-laden feces, attaining thousand-fold concentration increases within a few days, and that depuration occurs much more slowly over a period of a few weeks.

Last year, marine survival of juvenile pink salmon released *en masse* from PWS hatcheries was found to be significantly associated with pristane concentration increases in mussels near hatcheries 2 - 3 weeks following releases. Pristane concentrations have been monitored during Spring at a network of 30 stations for each of the last 5 years in PWS. Comparison of (1) the number of returning adults to a hatcheries, with (2) pristane concentration *increases* in mussels collected from sampling stations within 25 km of that hatchery 2 - 3 weeks following release of juveniles, showed that 62% of the interannual variability of returning adults is explained by pristane increases ($P < 0.001$, $df = 13$). These results strongly suggest that continued monitoring of pristane in mussels may have predictive value to forecast marine survival of hatchery-released pink salmon.

This proposal signals the transition of this project from a research project to more of a validation project. This transition exploits the results of the research phase to optimize the monitoring design. Six samplings are proposed, biweekly beginning early April through end of June, to address the temporal variability of the spring zooplankton production and hatchery release strategies. The network of sampling stations has been increased by 11 to optimize geographic coverage near the hatcheries. Two stations were dropped because of the difficulty of access. The current network of stations permits assessment of the relation of marine survival estimates for hatchery pink salmon to wild stocks in PWS.

NEED FOR THE PROJECT

A. Statement of Problem

Pink salmon are a recovering species in PWS. This project will assess feeding conditions for juvenile pink salmon during the critical period of initial marine residence, and will forecast survivals through this period. If these forecasts are sufficiently reliable, they may help improve management of salmonids in PWS. Improved management will aid the full recovery of this species.

B. Rationale

Pristane in PWS mussels has been monitored for the last 5 years to assess whether seasonal variability of tissue concentrations may be related to recruitment of salmon. Pristane is an

environmentally persistent hydrocarbon naturally produced by *Neocalanus* copepods in PWS. These copepods account for nearly all of the planktonic biomass available as prey for zooplanktivorous fishes during early Spring, especially juvenile pink salmon during initial marine residence. Laboratory and field experiments have confirmed that these fishes excrete some of the pristane ingested with *Neocalanus* copepods in feces, and the feces are subsequently ingested by mussels. The time scale for pristane accumulation by mussels exposed to pristane-laden feces is a few days, and for depuration of accumulated pristane a few weeks. Monitoring pristane concentration increases in mussels during Spring thus indicates the conversion of nearby copepods into fish feces, implying growth of the zooplanktivorous predators. Rapid growth during early life history is essential for high survival. Verification of survival forecasts will permit more precise assessment of human impacts on this species.

C. Location

Mussel samples will be collected in Prince William Sound and will be analyzed for pristane concentrations at the Auke Bay Laboratory, Juneau, Alaska. Marine survival forecasts for pink salmon will help improve management of salmonids in PWS. Educational materials and the brochure will be most appropriate for residents and students of Prince William Sound, but will also be available for others.

COMMUNITY INVOLVEMENT

We will continue to involve Prince William Sound residents in this project to share knowledge and interest in PWS ecosystems and to reduce sampling costs. Since 1994, the Prince William Sound Aquaculture Association has collected mussels near their 4 hatcheries at the appropriate times and stored them until the end of the season for pick-up. This year students with Youth Area Watch (Project 00210) and independent students will again be collecting mussels near their hometowns, Tatitlek, Whittier, Chenega, Kenny Cove, Valdez, Cordova, and Seward, and may be assisting with collections at other sites. We will provide materials for each participating school that explains the rationale of the project, and compares specific results for each school with the results for the whole effort. The underlying biology of this project gets to the heart of how the sound turns sunlight into fish, which we believe can provide a very useful local teaching resource. Youth Area Watch students will also continue to participate in a 1 day workshop at Auke Bay Laboratory on laboratory analysis techniques for pristane in mussels.

PROJECT DESIGN

A. Objectives

In 2001 this project has 4 objectives:

1. Develop a formal model relating fecal production by pink salmon with the expected number of returning adults.

2. Forecast marine survival of hatchery-released pink salmon in PWS.

3. Evaluate the feasibility of extending pink salmon survival forecasts to other salmonids.

4. Explore the feasibility of relating the physical and biological features of the ecosystem to production of pristane and its accumulation by mussels.

B. Methods

Objective 1: Formal Model Development

Previous work indicates a surprisingly strong association between pristane increases in mussels near PWSAC hatcheries immediately following mass releases of juvenile pink salmon, and the number of adults returning to the hatcheries 16 months later. This association may be formally stated as follows. Let $\{m_{i,j,25}\}$ denote the set of j mussel sampling stations near the ith hatchery, where J(i) is the total number of stations within 25 km of the i^{th} hatchery, and the total number of hatcheries is I (=3). For each hatchery, assume mussels are collected and analyzed for pristane from all the stations $\{m_{i,j,25}\}$ just prior to a mass release of juvenile pink salmon, and again two to three weeks later. Pristane concentrations in mussels near hatcheries often increase substantially during this interval because of fecal production by the released salmon. From the analysis results, the change of the pristane concentration in mussels at each station may be calculated for this two to three week interval. Let $m_{i,j=j',25}$ indicate the station (j') within 25 km of the i^{th} hatchery where the *maximum* concentration increase of pristane is observed among the sampled mussels, and let $\Delta P(m_{i,j=j',25})$ denote the magnitude of this increase. Finally, let $N_{r,i}$ denote the number of adult survivors of the released cohort that return to the ith hatchery. The association of $N_{r,i}$ and $\Delta P(m_{i,j=j',25})$ is modeled simply as $N_{r,i} = a\,[\Delta P(m_{i,j=j',25})] + b + \epsilon_i$ (eq 1), that is the number of surviving pink salmon is related to the maximum increase of pristane in mussels collected anywhere within 25 km of a hatchery two to three weeks following release of juveniles, ϵ_i is the error for the i^{th} hatchery.

Regression of adult pink salmon returns with the associated $\Delta P(m_{i,j=j',25})$ at each of 3 PWSAC hatcheries for 5 brood years (1994-1998) produces a very highly significant association ($P<0.0003$, $df = 13$) wherein $\Delta P(m_{i,j=j',25})$ explains 62% of the variability of $N_{r,i}$ among hatcheries and across brood years. The strength of this association strongly suggests that survival through the early marine residence period largely determines recruitment to the returning adult cohort population.

The rationale for $\Delta P(m_{i,j=j',25})$ as a predictor variable derives from physical and biological constraints. After juvenile pink salmon commence marine residence, they must locate adequate prey densities to support rapid growth to avoid increasing vulnerability to predation or starvation. At 3 cm initial body length and swimming at 1 body length per second, these juveniles can travel a maximum of about 2.5 km per day, and hence are semi-planktonic. The pristane-producing *Neocalanus sp.* dominate the zooplankton of PWS are in early May when juvenile pink salmon begin marine residence, and concentrations of these zooplankters together with juvenile pink salmon may appear adjacent to shorelines in response to wind-, tidal- or density-driven surface currents. These concentrations of juveniles and their *Neocalanus sp.* prey therefore likely have a strong random component, hence the need for a network of stations surrounding the hatcheries. A large increase of pristane in mussels near a hatchery following release of juvenile hatchery pink salmon indicates that zooplankton prey were successfully located by a substantial portion of the released salmon. The maximum observed pristane increase $\Delta P(m_{i,j=j',25})$ is therefore used as an indicator of the most favorable feeding conditions in the vicinity of a hatchery. This is where growth and survival are likely greatest, and hence where the greatest contributions to numbers of returning adults occur.

The two to three week sampling interval is suggested by the uptake and depuration kinetics of pristane associated with fecal material produced by pink salmon and accumulated by mussels. Both laboratory and field experiments have shown that increased pristane concentrations appear in mussels within a few hours to a few days following introduction of pristane-laden fecal material to mussels, whereas the depuration half-life is two to three weeks. Also, juvenile pink salmon probably need to begin rapid growth within the first week of marine residence or face severe predation.

The 25 km radius criterion for identifying the mussel collection stations associated with a particular hatchery $\{m_{i,j,25}\}$ corresponds with the distance juvenile pink salmon can swim during their first 10 days of marine residence. Surface currents may well transport juveniles faster than this, but these are unlikely unidirectional across 25 km distances given the heavily indented shoreline characteristic of PWS. Failure to locate abundant prey within 25 km of a hatchery would likely result in substantial weakening and increased vulnerability to predation.

The absence of density dependence implicit in eq 1 may be a consequence of the factors integrated by the $\Delta P(m_{i,j=j',25})$. Intuitively, no fecal material will be produced by juveniles that are starving, or that are killed by predators. However, it is unclear at present what functional relationship is to be expected between the amount of fecal material produced by apopulation of juvenile salmon that are growing and also being killed by predators, and the number of survivors. From this perspective, eq 1 must be regarded as an empirical approximation. To better address this issue, a formal 3-parameter model for the expected relationship between $N_{r,i}$ and $\Delta P(m_{i,j=j',25})$ will be developed. The parameters will include instantaneous growth and mortality rates, and the variation of mortality rate with body size. Other relevant variables such as daily ration rate, assimilation efficiency, and the interaction of mortality with growth can be expressed in terms of these 3 independent parameters. Successful development of this model will help

identify functional expectations for how sensitively fecal production would respond to food limitation compared with increased predation, and thus help to relate the $\Delta P(m_{i,j=j',25})$ to other physical and biological ecosystem processes.

Objective 2: Forecasting Marine Survival of Hatchery Produced Pink Salmon

Objective 2 will be addressed by applying eq 1 to pristane concentrations found in mussels from stations within 25 km of hatcheries. The number of stations near hatcheries has been increased to insure that possible migration routes are better represented. Application of eq 1 produces forecasts of numbers of adult pink salmon predicted to each hatchery, thus introducing geographic discrimination among hatchery environs. Comparison of predictions with subsequent returns of adults will permit on-going validation of the approach. Ths first set of predictions have been made in the FY99 annual report for this project, which will be compred with adults returns during fall 2000.

Objective 3: Forecasting Marine Survival of Non-Hatchery Salmon

Objective 3 will be addressed by comparing survival indicators for wild pink salmon and for other salmon species with the $\Delta P(m_{i,j=j',25})$, and with predictors analogous to $\Delta P(m_{i,j=j',25})$. The other survival indicators may include results from ADF&G surveys and fishery catch records. An attempt will be made to evaluate possible stock or regional differences by using a predictor analogous to the $\Delta P(m_{i,j=j',25})$ for stock or geographic regions to be defined later. At a fairly gross level this approach is likely to be successful, because the ΔP values typical of eastern PWS mussel sampling stations during May have generally been much lower than western PWS throughout the life of this project, and wild pink salmon production in eastern PWS has been commensurately low.

Objective 4: Explore the feasibility of relating the physical and biological features of the ecosystem to production of pristane and its accumulation by mussels.

The large-scale ecosystem projects such as SEA may have models or data sets describing biological or physical processes that would be expected to modulate densities of zooplankton and pink salmon juveniles, and these could be compared with the pristane monitoring results of this project to evaluate possible linkages. The feasibility of evaluating such linkages will be explored over the next year, and compelling opportunities will be proposed in the DPD for FY02.

The specific methods for mussel collection, pristane analysis, dry weight determination, etc. have been described in DPDs for previous years of this project, and re not repeated here.

Because there is no other practical way of estimating energy conversion from *Neocalanus* to their near-shore predators over a broad geographic area such as PWS, there are no alternative

methodologies to consider here.

C. Contracts and Other Agency Assistance

There will be no contracts under this project.

SCHEDULE

A. Measurable Project Tasks for FY01

FY01:

Apr 1 - June 30: Collect mussel samples.

Jul 1 - Sep 30: Analyze 2001 samples for pristane, summarize results in a report

B. Project Milestones and Endpoints

Write report by Dec. 31, 2001

C. Completion Date

Dec. 31, 2001

PUBLICATIONS AND REPORTS

An annual report will be produced by December 31, 2001.

NORMAL AGENCY MANAGEMENT

NOAA/NMFS has statutory stewardship for most living marine resources; however, if the oil spill had not occurred, NOAA would not be conducting this project. NOAA/NMFS proposes to make a significant contribution (as stated in the proposed budget) to the operation of this project, making it truly cooperative.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

We are cooperating closely with Youth Area Watch (01210), which is providing us with samples

and to whom we are providing training and educational materials.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

The changes are the result of optimizing sampling to evaluate responses of pristane concentrations in mussels following mass-releases of pink salmon from PWS hatcheries.

PROPOSED PRINCIPAL INVESTIGATOR

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PRINCIPAL INVESTIGATOR

Jeffrey W. Short

Education:
BS, 1972, University of California, Riverside (Biochemistry & Philosophy)
MS, 1982, University of California, Santa Cruz (Physical Chemistry)

Relevant Experience:
1989- Present: Established and managed the hydrocarbon analysis facility at ABL to analyze hydrocarbon samples generated by the *Exxon Valdez* NRDA effort (about 20% of these samples were analyzed at ABL).
1989 - 1992: Principal Investigator, Exxon Valdez project Air/Water #3: Determination of petroleum hydrocarbons in seawater by direct chemical analysis and through the use of caged mussels deployed along the path of the oil spill.
1991 - 1996: Principal Investigator, Exxon Valdez project Subtidal #8: Development of computer-based statistical methods for global examination of sediment and mussel hydrocarbon data produced for the Exxon Valdez NRDA effort for systematic bias, and for identification of probable sources of hydrocarbons. In addition, this project produced both hard-copy and computer display maps of all the sediment and mussel hydrocarbon data.
1994 - 1995: Initiated data analysis and pilot projects that established the role of pristane in Prince William Sound.
1996-1997 Principal Investigator 96195 and 97195

Prepared 4/12/2000
Project 01195

OTHER KEY PERSONNEL

Patricia M. Harris

Education: University of Alaska Fairbanks; B.S. Biological Science 1966
Graduate work at U of A Fairbanks, U of A Southeast, University of British Columbia

Relevant Experience:
1989-1992: Co-principal investigator of NRDA study Subtidal 3, was responsible for field logistics and sample collection and assisted in data analysis and report preparation; also assisted other NRDA projects in field collections.
1992 -1996: participated in study design, field work, proposal preparation, data analysis, and report preparation for mussel bed monitoring and restoration (R103-96090).
1994-1997 Participated in logistic planning, sampling, and community involvement coordination for the pilot pristane project ,96195, and 97195.

Relevant publications: Co-author of final reports for NRDA study Subtidal 3 and several publications pertaining to distribution of *Exxon Valdez* oil in mussels and underlying sediments. Several public presentations of oil-related scientific research.

Responsibilities: Coordinate sample collection logistics and collect mussel samples; data analysis; report and proposal preparation; and preparation of science educational materials, posters, and reports.

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 to September 30, 2001

approved 4-3-00

Budget Category:	Authorized FY 1999	Proposed FY 2000
Personnel	$16.6	$21.9
Travel	$26.2	$26.2
Contractual	$1.5	$1.0
Commodities	$3.5	$2.5
Equipment	$0.0	$0.0
Subtotal	$47.8	$51.6
General Administration	$2.6	$3.4
Project Total	$50.4	$55.0
Full-time Equivalents (FTE)		0.3
Other Resources		23.3K

LONG RANGE FUNDING REQUIREMENTS					
		Estimated FY 2002	Estimated FY 2003		
		$55.0	$55.0		

Dollar amounts are shown in thousands of dollars.

Comments:

NOAA contribution: Principle Investigator, Senior Research Chemist Jeff Short 1.5 months@15 K, Zoologist Pat Harris 1.5 mo @ 9.5K for a total NOAA contribution of 23.3K.

FY00

Prepared: 4/13/00

Project Number: 01195
Project Title: Pristane Monitoring in Mussels
Agency: National Oceanic and Atmospheric Administration

FORM 3A
TRUSTEE
AGENCY
SUMMARY

2001 EXXON VALDEZ TRUSTE UNCIL PROJECT BUDGET

October 1, 2000 to ember 30, 2001

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2000
Pat Harris	Zoologist	11/4	1.0	6.4		6.4
Josie Lunasin	Chemist	9/6	1.8	5.8		10.4
Jeff Short	Senior Research Chemist	13/6	0.5	10.1		5.1
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		3.3	22.3	0.0	
					Personnel Total	$21.9

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FY 2000
anchorage Workshop	0.4	1	3	0.2	1.0
					0.0
Cordova	0.4	6	24	0.2	7.2
					0.0
air charter 18 days @ 1K/day	1.0	18			18.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$26.2

FY00

Prepared: 4/13/00

Project Number: 01195
Project Title: Pristane Monitoring in Mussels
Agency: National Oceanic and Atmospheric Administration

FORM 3B
Personnel
& Travel
DETAIL

2001 EXXON VALDEZ TRUSTE UNCIL PROJECT BUDGET

October 1, 2000 to ember 30, 2001

Contractual Costs:	Proposed
Description	FY 2000
Temporary labor to analyze pristane samples	1.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$1.0

Commodities Costs:	Proposed
Description	FY 2000
Chemicals, glassware and chemistry laboratory supplies to analyze samples	2.5
Commodities Total	$2.5

FY00

Prepared: 4/13/00

Project Number: 01195
Project Title: Pristane Monitoring in Mussels
Agency: National Oceanic and Atmospheric Administration

FORM 3B
Contractual & Commodities DETAIL

2001 EXXON VALDEZ TRUSTE UNCIL PROJECT BUDGET

October 1, 2000 to ember 30, 2001

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2000
			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

FY00

Prepared: 4/13/00

Project Number: 01195
Project Title: Pristane Monitoring in Mussels
Agency: National Oceanic and Atmospheric Administration

FORM 3B
Equipment
DETAIL