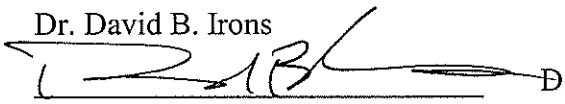
PROPOSAL SIGNATURE FORM

THIS FORM MUST BE SIGNED BY THE PROPOSED PRINCIPAL INVESTIGATOR AND SUBMITTED ALONG WITH THE PROPOSAL. If the proposal has more than one investigator, this form must be signed by at least one of the investigators, and that investigator will ensure that Trustee Council requirements are followed. Proposals will not be reviewed until this signed form is received by the Trustee Council Office.

By submission of this proposal, I agree to abide by the Trustee Council's data policy (*Trustee Council Data Policy**, adopted July 9, 2002) and reporting requirements *(Procedures for the Preparation and Distribution of Reports***, adopted July 9, 2002).

PROJECT TITLE: **Pigeon Guillemot Restoration Research in Prince William Sound**

Printed Name of PI: Dr. David B. Irons

Signature of PI:  Date: January 26, 2007

Printed Name of co-PI: Dr. Daniel D. Roby

Signature of co-PI: _____ Date _____

Printed Name of co-PI:

Signature of co-PI: _____ Date _____

* **www.evostc.state.ak.us/Policies/data.htm**

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FY07 INVITATION
PROPOSAL SUMMARY PAGE

Project Title: Pigeon Guillemot Restoration Research in Prince William Sound

Project Period: April 16, 2007 to April 15, 2010

Proposer(s): Dr. David B. Irons, Migratory Bird Management, U. S. Fish and Wildlife Service, david_irons@fws.gov, Phone (907) 786-3376.

Dr. Daniel D. Roby, Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis, Oregon daniel.roby@orst.edu phone:541-737-1955

Study Location: Prince William Sound, Alaska

Abstract: This proposed study would investigate the efficacy of direct restoration techniques for the Pigeon Guillemot population in Prince William Sound. This seabird is the only EVOS injured species that has failed to show any signs of recovery. The post-EVOS guillemot population in PWS is only 15% of the pre-EVOS population; about one-third of PWS guillemots nested on Naked Island pre-EVOS. Post-EVOS, mink predation was identified as a limiting factor for recovery of Naked Island guillemots. We propose testing the hypothesis that mink were introduced to the Naked Island Archipelago by fur trappers and, if not, determine if the mink population on the Naked Island Archipelago a distinct population segment. We also propose investigating the feasibility and efficacy of removing mink from the Naked Island Archipelago as a restoration activity for Pigeon Guillemots. In addition, we propose testing the hypotheses that (1) nest predation by mink continues to be a major limiting factor for guillemot recovery at Naked Island, and (2) the availability of key prey resources does not limit guillemot nesting success at Naked Island. A final report will be prepared upon completion of the two years of field and lab work that will propose the most effective and justifiable plan for management action to restore Pigeon Guillemots in the Naked Island Archipelago.

Funding: EVOS Funding Requested: FY 07 = $ 317.0K
FY 08 = $ 284.3K
FY 09 = $ 48.4K
TOTAL EVOS Funds Request: $ 649.7K

Non-EVOS Funds to be Used: FY 07 = $ 129.0K
FY 08 = $ 129.0K
FY 09 = $ 36.0K
TOTAL Non-EVOS Funds Contributed: $ 294.0K **PROJECT TOTAL: $ 943.7K**

Date: January 26, 2007

Title: PIGEON GUILLEMOT RESTORATION RESEARCH IN PRINCE WILLIAM SOUND

INTRODUCTION

The Pigeon Guillemot (*Cepphus columba*) population in Prince William Sound (PWS), Alaska has failed to show any signs of recovery from declines that occurred both before and after the *Exxon Valdez* Oil Spill (EVOS). Since the year 2000, the size of the PWS breeding population has remained at about 2,000 individuals (U.S. Fish and Wildlife Service, unpubl. data), less than 15% of the population size in the 1970s (Isleib and Kessel 1973). This dramatic decline has been blamed partly on the EVOS, both through direct mortality from oiling (Piatt et al. 1990) and indirectly through effects of oil on the guillemot food supply, as well as changes in food availability related to long-term shifts in ocean conditions (Golet et al. 2002). Post-spill studies of Pigeon Guillemot reproductive success have identified three primary factors limiting population recovery: (1) mink predation on eggs, chicks, and nesting adults, a major source of nest failure (Hayes 1996, Prichard 1997, Golet 1999); (2) declines in the proportion of high-lipid schooling fishes in the diet of nesting guillemots (e.g., Pacific sand lance, *Ammodytes hexapterus*, in the diet at Naked Island, PWS; Golet et al. 2000, Litzow et al. 2002), and (3) exposure to residual oil in the environment from EVOS (Seiser et al. 2000, Golet et al. 2002).

The population of Pigeon Guillemots in Prince William Sound during the 1970s was about 15,000 individuals, and the Naked Island Archipelago in central PWS supported about one third of the total population of Pigeon Guillemots in PWS, or about 5,000 individuals (Isleib and Kessel 1973). The sub-population of Pigeon Guillemots on Naked Island was fortuitously the subject of research prior to the EVOS (Kuletz 1983), so it has been possible to compare numbers of breeding pairs, diet composition, and nesting success of Pigeon Guillemots on Naked Island before and after EVOS (Oakley and Kuletz 1994). Although the Naked Island Archipelago still supports nearly a third of the total breeding population of guillemots in PWS (USFWS, unpubl. data), the total PWS population of Pigeon Guillemots is currently less than half the number of guillemots that formerly nested on just the Naked Island Archipelago during the 1970s.

Predation on Pigeon Guillemot eggs and chicks at Naked Island was minimal before EVOS (Kuletz 1983), but post-spill studies have recorded high levels of predation, particularly from mink (Hayes 1995, Golet et al. 2002). High nest predation rates are thought to significantly reduce the productivity of the local guillemot population, increase breeding dispersal (lack of fidelity to a previously used nest site or location) of established breeders, and decrease the immigration of guillemots from other colonies. While Pigeon Guillemots typically have high fidelity to a nest site, disturbance and lack of breeding success can increase the rate and distance of breeding dispersal. Populations suffering high levels of disturbance, such as persistent nesting failure due to terrestrial predators, will decline due to a lack of production of new recruits, dispersal of breeding birds, and/or decreased immigration. Coupled with the already drastically reduced size of the guillemot breeding population, mink predation on the few remaining guillemot nests may now be the primary factor limiting recovery of the guillemot population on the Naked Island Archipelago, and perhaps elsewhere in PWS.

The proportion of high-lipid schooling forage fish in the diet has been shown to be a key factor in guillemot reproductive success at Naked Island and other sites in southcentral Alaska. The Alaska Predator Ecosystem Experiment (APEX) Project components F (Factors Limiting Pigeon Guillemot Recovery), G (Seabird Energetics), and M (Seabird/Forage Fish Studies in Lower Cook Inlet) jointly investigated the relationship between a lack of recovery in guillemot populations injured by the EVOS and the availability and quality of forage fish. A decline in availability of high-lipid forage fishes (i.e., sand lance, herring, capelin) in the last three decades contributed to lower growth rates, fledging weights, post-fledging survival, and adult recruitment in guillemot populations within the EVOS area (Piatt and Anderson 1996, Anderson and Piatt 1999, Golet et al. 2000). A study using captive-reared guillemots demonstrated that chick growth rates and fledging mass were significantly enhanced when chicks were fed diets of high-lipid forage fish (Hovey 2002).

The Nearshore Vertebrate Predator (NVP) Project (Pigeon Guillemot component) tested the hypothesis that exposure to residual oil from the spill limited recovery of Pigeon Guillemots in the decade following the EVOS. Pigeon Guillemots feed on a diversity of nearshore demersal fishes and schooling forage fish that use the substrate to avoid predators (e.g., sand lance), prey that were likely injured by EVOS. The approach of the NVP study was to measure certain biomarkers in blood and liver biopsies and compare biomarker levels in nestlings and adults from oiled and un-oiled areas (Seiser et al. 2000, Golet et al. 2002). These studies indicated some differences between oiled and un-oiled parts of PWS in blood and liver biomarkers from guillemots eight to 10 years after the spill. A study conducted at the Alaska SeaLife Center with captive-reared Pigeon Guillemot chicks fed controlled doses of weathered Prudhoe Bay Crude Oil (PBCO) revealed that elevated levels of hepatic cytochrome P4501A (CYP1A) were the most reliable indicator of exposure to residual oil from the EVOS (Hovey 2002). Hepatic CYP1A levels in adult guillemots from Naked Island were elevated a decade after the spill, suggesting that continued exposure to residual oil may have limited population recovery (Golet et al. 2002). By 2004 (15 years after the spill), however, hepatic CYP1A levels of guillemots nesting on Naked Island were no longer elevated compared to controls from the un-oiled portion of PWS (Ballachey et al. 2006). Consequently, it appears that residual oil is no longer a factor limiting recovery of the Pigeon Guillemot population from the EVOS, at least not at Naked Island.

The American mink (*Neovison vison* AKA *Mustela vison*) is native to most of Alaska, including the shoreline of Prince William Sound. It is not clear, however, that the mink population on the Naked Island Archipelago (Naked, Peak, and Storey islands) is native; mink may have been intentionally introduced to the Naked Island Archipelago and other islands in PWS by fur trappers, much the way arctic foxes (*Alopex lagopus*) were introduced to most of the Aleutian Islands. Introduced predators, like mink and arctic fox, significantly reduce reproductive success and depress or extirpate populations of ground-nesting birds on islands.

Mink have been farmed in North America for at least 100 years. The industry was most widespread in the 1920s through 1960s (M. Fleming, pers. comm.). The ability of ranch mink to survive and reproduce in the wild is well known from the species' invasive status in Europe, Asia, and South America. In 1951, 24 fur farm-reared mink from the Petersburg Fur Experiment

Farm were released on Montague Island in southern Prince William Sound by the U.S. Fish and Wildlife Service and the Alaska Game Commission (Burris and McKnight 1973). This stocking of fur farm mink was intended to establish a trappable population on an island where mink did not naturally occur. Although the release was successful in establishing a trappable population, apparently the pelts of these mink were inferior and few were subsequently trapped (Burris and McKnight 1973).

Montague Island is only 10 km from the nearest large island (Latouche Island), where mink were likely to have colonized on there own (open water crossings between Latouche Island and the mainland are less than 1.5 km). The three main islands in the Naked Island Archipelago (Naked, Peak, and Storey are separated by open water crossings of 1.2 km or less. The closest island to the Naked Island Archipelago is Eleanor Island, to the southwest of Naked Island; the two islands are separated by 6 km of open water. The next nearest island to the Naked Island Archipelago is separated by at least 14 km of open water. While it is possible that mink colonized the Naked Island Archipelago from the mainland on their own, presumably from Knight Island via Eleanor Island, natural colonization seems unlikely given that mink had not colonized Montague on their own. If the Naked Island Archipelago did not support a native population of mink, it seems very likely that fur trappers would have introduced them. Consequently, a strong case can be made that the presence of mink on the Naked Island Archipelago is the result of human introduction.

In Prince William Sound (PWS), predation by introduced predators could certainly have a confounding effect on recovery of ground-nesting seabirds, such as Pigeon Guillemots, that have been injured by EVOS. Predation on nesting adult Pigeon Guillemots, their eggs, and their young in the Naked Island Archipelago, an area of PWS affected by EVOS, increased in the decade following the spill. In 1998, ca. 80% of monitored guillemot nests were depredated, and mink were responsible for ca. 75% of these losses (USFWS, unpubl. rept.). All available evidence indicates that removal of mink from the Naked Island Archipelago would significantly increase reproductive success of Pigeon Guillemots in the area. If it can be shown that mink were introduced to the Naked Island Archipelago by man, then mink removal would likely not only be an effective approach for restoring the Pigeon Guillemot population, but would also be an important management objective for restoration of natural ecological communities on the Naked Island Archipelago.

Pigeon Guillemots forage in the nearshore environment within a few kilometers of their colonies, but feed on both demersal and schooling fish. Although differences in the diet of guillemot chicks certainly reflect local differences in the availability or abundance of prey, there are clear indications of adult prey specialization patterns within colonies (Kuletz 1983, Golet et al. 1998). Schooling fish such as sand lance, herring, and capelin may be subject to temporal and spatial fluctuations in abundance. Nearshore demersal fish probably constitute a more predictable food source. At Naked Island, the proportion of Pacific sand lance in the diet of guillemot chicks declined dramatically from pre-EVOS (1979) to post-EVOS (1994), and gadids, which were generally not present in the diet before the *Exxon Valdez* oil spill, made up a much larger proportion of the diet post-EVOS (Oakley and Kuletz 1994, Hayes 1995, Golet et al. 1998).

At numerous guillemot colonies around Naked Island, the number of breeding birds has decreased considerably since 1979. In the absence of schooling fish, guillemots must rely more heavily on demersal fish. Competition for these demersal fish over the limited shallow-water foraging area surrounding Naked Island may be preventing some adults from breeding or successfully raising their young. The post-spill decline in sand lance in the diet of guillemots breeding at Naked Island might be a key element in the failure of this species to recover from the oil spill. Pre-spill studies of Pigeon Guillemots breeding at Naked Island suggest that sand lance are a preferred prey during chick-rearing. In 1979-1981 a relatively large proportion of the breeding guillemots at Naked Island specialized on sand lance; by the late 1990s there were fewer specialists, probably because this resource was too scarce and patchy. Breeding pairs that specialized on sand lance tended to initiate nesting attempts earlier and produce chicks that grew faster and fledged at higher weights than breeding pairs that preyed mostly upon blennies and sculpins in years when sand lance were readily available (Kuletz 1983). Even after EVOS (1989-1990 & 1994-1997), when high energy density schooling fishes, such as sand lance, were less available, adults that specialized on them had chicks that grew faster and attained higher overall reproductive success than adults that specialized on lower energy demersal fishes or gadids. Thus, the overall productivity of the guillemot population appears to be higher when sand lance and other high energy density fishes are more widely available. The high lipid content of many of the pelagic schooling fishes relative to that of demersal fishes and gadids (Anthony et al. 2000), certainly make these prey fishes a high-quality forage resource for PWS Pigeon Guillemots. This is consistent with the observation that other seabird species (e.g., puffins, murres, kittiwakes) experience enhanced reproductive success when sand lance are available (Pearson 1968; Harris and Hislop 1978; Hunt et al. 1980; Vermeer 1979, 1980). This study will assess whether availability of high-energy schooling fishes, such as sand lance, continues to limit the productivity of guillemots nesting on Naked Island.

I. NEED FOR THE PROJECT

A. Statement of Problem

The population of Pigeon Guillemots in Prince William Sound (PWS) has decreased from about 15,000 in the 1970s (Isleib and Kessel 1973) to about 2,000 in the year 2000 (Agler et al. 1994; USFWS, unpubl. data). While this decline apparently began prior to the EVOS, about 10-15% of the guillemot population in the spill area died as a direct result of the spill. An estimated 2,000 to 3,000 Pigeon Guillemots were killed throughout the spill zone immediately after the spill (Piatt et al. 1990). Based on censuses conducted in and near the Naked Island Archipelago (Naked, Peak, Storey, Smith, and Little Smith islands), pre-spill counts (ca. 2,000 guillemots) were roughly twice as high as post-spill counts (ca. 1,000 guillemots). Post-spill censuses have not detected any increase in numbers of guillemots since EVOS, but instead gradual declines. This indicates that no recovery by Pigeon Guiilemots has occurred in the aftermath of the spill. Recent analyses provide a clear demonstration that numbers of breeding guillemots declined more along oiled shorelines than un-oiled shorelines pre- to post-spill (Oakley and Kuletz 1994; Golet et al. 2002; D.B. Irons, *unpubl. data*). Reasons for the lack of recovery are changes in prey resource availability, exposure of guillemots and their prey to residual oil, and nesting failure

due to predation on guillemot eggs, nestlings, and adults, especially by mink.

While predation on Pigeon Guillemot eggs and chicks at Naked Island was minimal before EVOS, post-spill studies have recorded high rates of predation by mink (Hayes 1995, Golet 1998). High mink predation rates on the already depressed guillemot population are unlikely to relent because mink are generalist predators that prey on a wide variety of birds, mammals, and fish. Consequently, in order to begin restoration of Pigeon Guillemots to their former numbers prior to EVOS, it will likely be necessary to reduce the mink population on the Naked Island Archipelago. Complete eradication of mink on Naked, Peak, and Storey islands would likely provide a refugium from mink predation for a variety of ground-nesting birds, including Pigeon Guillemots. Before initiating a major effort to completely remove mink from the Naked Island Archipelago, however, it is necessary to address two questions: (1) was the mink population on the Naked Island Archipelago introduced (to enhance fur trapping opportunities) and, if not, (2) are the mink on the Naked Island Archipelago a genetically differentiated, insular population that has been reproductively isolated from mainland populations long enough to evolve local adaptations to their island environment.

If the mink population on Naked Island was introduced, there is a good chance that the animals used to stock the island were from a mink fur farm. Should genetic analyses of mink from the Naked Island Archipelago indicate that the population originated from fur farm stock, than the conservation rationale for removing all mink from the Naked Island Archipelago is compelling. Mink are apparently a keystone predator for the ecological community on Naked Island, and their removal would likely have profound effects on populations of other vertebrates native to the archipelago. On the other hand, if population genetic analyses indicate that mink from Naked Island were not introduced, then the genetic data can be used to determine whether mink from the Naked Island Archipelago are indistinguishable from mink on the mainland of PWS, as well as the large islands nearest to Naked Island (Eleanor and Knight islands). Should genetic analyses reveal that mink from the Naked Island Archipelago are not genetically distinct, and therefore do not represent an Evolutionarily Significant Unit (ESU) or distinct population segment, then mink control or even complete removal could be accomplished without raising conservation concerns for the mink population itself.

Releases of mink from most local fur farms in the early 20th century probably had relatively little impact on the genetics of natural populations. Later, larger scale releases, like that from the Petersburg Fur Farm, are likely to be documented somewhere in agency records. In other words, we should be able to identify 'native Alaskan' mink (if not native PWS mink) genetically using specimens from areas with no documented introductions. Releases that occurred later in the history of mink farming (after the 1940s) are more likely to involve what we think of today as 'domesticated' fur farm mink and include alleles from non-Alaskan populations. Thus, we should be able to recognize fur farm ancestry in wild-caught mink by alleles, and maybe haplotypes, common in fur farm and/or non-Alaskan mink populations (M. Fleming, pers. comm.). If wild mink were rare or absent from Naked Island when the fur farm animals were introduced, it is likely that the population there has a higher number of non-Alaskan alleles than the mainland population, regardless of whether or not native populations have rebounded.

Our ability to confirm fur farm origins for Naked Island mink depends on the introduced mink having been typical fur farm mink of the period in having mixed Eastern and Alaskan ancestry. Samples of mink from adjacent native populations that have not experienced large-scale fur farm releases are also required. If both these criteria are met, we should be able to distinguish some proportion of introduced mink (maybe all) from wild Alaskan mink by looking at a sufficient numbers of microsatellite loci. We may also be able to distinguish some introduced mink based on mtDNA haplotype sequences (M. Fleming, pers. comm.). If we can identify alleles or haplotypes in Naked Island mink that are not otherwise found in other Alaskan or PWS mink populations, but are found in fur farm mink or other non-Alaskan populations, then that would argue strongly for the Naked Island population being introduced, at least in part. There should be USDA records regarding the Petersburg Fur Farm that would help us determine where their mink came from, as well as records of any current and past fur farms in the PWS area so we would know about potential genetic 'contamination' of other PWS/Alaskan populations.

One confounding factor that may limit the recovery of the Pigeon Guillemot population on the Naked Island Archipelago following mink control or eradication is guillemot food supply. If bottom-up factors (i.e., food availability) are limiting recovery of the guillemot population as much as top-down factors (i.e., mink predation), then mink removal will not by itself lead to recovery. Sand lance (*Ammodytes hexapterus*) has been identified as a key food resource for guillemots nesting in the Naked Island Archipelago (Oakley and Kuletz 1994, Golet et al. 2000). Pre-spill studies found sand lance, a nearshore schooling fish with relatively high average energy density, to be the dominant prey delivered to chicks. Post-spill studies have found gadids and nearshore demersal fish to constitute the majority of the diet. If sand lance remain scarce in the nearshore waters around the Naked Island Archipelago, then sand lance will constitute a small percentage of prey items in diets of guillemot chicks and reproductive success of guillemots nesting in the archipelago will remain below average, even in the absence of mink predation.

This study is relevant to EVOS Restoration Work because it is designed to inform the development of a restoration plan for Pigeon Guillemots, a species injured by the spill that is failing to recover.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

Considerable baseline data on Pigeon Guillemot populations in PWS and their reproductive and foraging ecology were collected both before and after the *Exxon Valdez* oil spill. There is a critical need for baseline information to understand the constraints that currently limit the recovery of Pigeon Guillemot populations affected by the oil spill, especially the guillemot population on Naked Island. This information will allow the design and implementation of an effective restoration plan for Pigeon Guillemots in PWS.

If nest predation by mink is still a source of significant reproductive failure for guillemots nesting on Naked Island, then mink control can be an effective method of enhancing guillemot nesting success and enhancing the local guillemot population. If not, then mink removal will do little to release the Naked Island guillemot population. Similarly, if sand lance is a minor or non-

existent prey type in guillemot diets, then mink removal will likely have a limited effect on enhancing the guillemot population.

This proposed research is designed to produce results that will allow for the design and implementation of an effective and defensible plan to restore the Pigeon Guillemot population on the Naked Island Archipelago. The results of the proposed research are critical for establishing the origins of the Naked Island Archipelago mink population, the status of the mink population as a distinct population segment, and the efficacy of mink removal as a restoration action for Pigeon Guillemots in PWS.

C. Location

This study would be conducted in Prince William Sound. The primary study site in Prince William Sound would be Naked Island, with additional data collection at other islands in the Naked Island Archipelago (Peak and Storey islands), as well as Smith, and Little Smith islands.

The information obtained from this project will benefit Pigeon Guillemot populations in Prince William Sound, especially in the Naked Island Archipelago. An understanding of the affect of mink predation on nest success of Pigeon Guillemots on Naked Island will help explain the role of mink in the continuing declines of the Pigeon Guillemot population in Prince William Sound. Assessing the role of food supply and potential continued exposure to residual oil from EVOS will provide critical information for designing an effective restoration program for Pigeon Guillemot populations throughout PWS.

II. PROJECT DESIGN

A. Objectives

This research project has three primary objectives listed below. During the third year of the project (CY 09), the emphasis will be on developing a restoration plan for Pigeon Guillemots nesting on Naked Island, based on results from the first three objectives.

1. Determine the feasibility of restoring the breeding population of Pigeon Guillemots on Naked Island
   using mink control. We propose answering the following questions:
   a) Is the mink population on Naked Island introduced, or is it the result of natural colonization?
   b) If the Naked Island mink population is the result of natural colonization, has the population
      evolved and differentiated sufficiently to be considered a distinct population segment,
      worthy of conserving?

b) Is mink predation currently a significant factor limiting guillemot nest success on Naked Island?

c) How feasible is it to trap and remove all mink from Naked Island and, if the removal is successful, how long will Naked Island likely remain mink-free?

2. Determine whether the size and productivity of the breeding population of Pigeon Guillemots on Naked Island is limited by food supply. We propose answering the following questions:

a) What is the current size of the Pigeon Guillemot breeding population on Naked, Peak, Storey, Smith, and Little Smith islands in central PWS?

b) Do the diets of most pairs of nesting guillemots consist primarily of nearshore demersal fishes (i.e., blennies, sculpins, pricklebacks), and include few high-lipid schooling forage fish (i.e., sand lance)?

c) Do less than half of all successful nesting pairs of guillemots raise 2-chick broods?

d) Are chick meal delivery rates, chick growth rates, and chick fledging masses below average?

3. Design a restoration plan for the Pigeon Guillemot population on Naked Island that is feasible, effective, and associated with a reasonable cost-benefit ratio. Potential restoration alternatives include:

a) removal of all mink from Naked Island

b) institute a lethal mink control program on Naked Island to drastically reduce the size of mink population

c) installation of artificial guillemot nest sites on Naked Island to reduce vulnerability to predation

d) lethal mink control and installation of artificial nest sites on Naked Island to further reduce vulnerability to predation

e) no action

B. Procedural and Scientific Methods

Objective 1: Mink on Naked Island

Origins of the Naked Island Mink Population

All population genetics analyses will be conducted in the laboratory of Dr. Joseph Cook, a full cooperator on this project. Both mtDNA and microsatellite primers that work well on mink have been developed in Dr. Cook's laboratory at the University of New Mexico.

A set of 14 mink and ermine microsatellite primers were developed in the late 1990's, and since then more than 130 additional mink primers have been developed and have primer sequences available in Genbank. Most of these primers have been developed for a mink genome mapping effort in Denmark, which will help inform our selection of additional markers to run.

Ten PWS mink are listed in the ARCTOS database from the University of Alaska Museum (UAM) collection, one from Esther Island, NW PWS, and nine from Jackpot Bay, SW PWS. Six of the Jackpot Bay samples are embryos of one of the others, which limits their utility for the present analysis. Other samples from nearby populations include one from the Kenai Peninsula (inland), nine from the Tonsina River, and four from the vicinity of Glenallen. A minimum 'uncontaminated' sample of 30-35 from PWS is necessary to ensure that the allele diversity represented in native mink is captured. Consequently, an additional 30 mink would be trapped along the mainland shoreline of PWS. UAM has another ca. 100 mink samples from Alaska outside of SE Alaska, mostly from the interior near Fairbanks. There is also microsatellite data for a Fairbanks population.

At least 50 samples from one fur farm in Washington state are available, including the two most common mink coat colors: 'standard dark' and mutation 'blue iris.' Additional samples would be obtained from other fur farms, particularly any farms remaining in the PWS area or elsewhere in Alaska. Pelting season, which typically is late fall/early winter, is the ideal time to collect many fresh samples. Farms sometimes also cull males and non-pregnant females right after the breeding season (March and April).

The Cook lab at UNM recently obtained samples from 8-10 eastern mink from New York State. There are also 12 mink from Arkansas in the UAM collection. The latter are much less likely to have fur farm contamination than the former, as their mtDNA haplotypes are distinct from Alaskan haplotypes and virtually identical to one another. The Cook lab previously developed a phylogeographic analysis of North Pacific Coast mink. If the eastern mink and the Naked Island samples are included, it should be possible to assess how the Naked Island samples compare with samples from the rest of Alaska.

The Cook lab has previous experience with detecting fur farm contamination in mink from SE Alaska. Preliminary microsatellite analyses suggest that the Chichagof Island mink possess a subset of alleles from the northernmost mainland sample, Juneau. But mink from the mouth of the Stikine River, Cleveland Peninsula, and Ketchikan have several private alleles not found in interior Alaska samples. Samples are being collected for a similar analysis of Vancouver Island mink, where mtDNA data suggest the endemic subspecies is quite distinct in one location, but fur farm contamination may be responsible for the similarity between other island populations and mainland ones. Comparing data from these analyses with that of PWS mink may help to distinguish 'fur farm' from native alleles.

Laboratory analyses of mink population genetics would proceed as follows. First, the

current panel of 12 microsatellites that we have mink data for on the New York, Arkansas, and some fur farm samples would be run to identify any uniquely eastern alleles or extreme allele frequency differences between eastern mink and our current SE Alaska sample (which includes interior Alaska around Fairbanks as an 'outgroup'). We would also run some mtDNA sequences from New York samples to see if they are as distinct from Alaska as Arkansas is. Then the existing PWS and Alaskan samples (other than Fairbanks & SE Alaska) would be run to expand our knowledge of the alleles and haplotypes typical of PWS and Alaska in general. Third, the 25 Naked Island samples would be run to determine whether they include eastern/fur farm alleles and/or haplotypes. Finally, additional microsatellite markers would be run as needed to obtain a panel of at least 12-15 that may distinguish eastern and Alaskan mink.

Concurrent with the laboratory analyses, we would investigate the mink from the Petersburg Experimental Fur Farm in 1951 and whether there were other documented releases of fur farm mink in PWS. Samples of any fur farm mink from PWS and additional wild samples from areas of PWS least likely to be influenced by fur farm releases would be obtained.

Identifying Guillemot Nest Sites:

Active guillemot nest sites (in burrows, under tree roots, or in rock crevices) must be identified for studies of productivity, nest predation rates by mink, diet composition, brood size, chick growth rates, adult prey delivery rates, chick fledging mass, and collection of bio-samples from adults and chicks. These nest sites will be used for capturing adult guillemots, thus allowing their banding, measuring, and marking, steps necessary for studies of adult foraging patterns and investigations of prey selection preferences by individual adults.

Monitoring Guillemot Nests:

Nests will be monitored throughout the breeding season to determine reproductive success parameters, brood size, chick growth rates, chick fledging mass, and predation rates by mink. All accessible burrows would be checked initially in early June (every couple of days if possible) to determine if egg(s) are present. Then, beginning late in incubation, nests will be checked every 5 days. Nest checks will terminate when nestlings fledge or it has been positively determined that the nesting attempt failed.

Objective 2: Food Limitation for Naked Island Guillemots

Guillemot Population Censusing:

In PWS, guillemots will be censused at Naked, Peak, Storey, Smith, and Little Smith islands on the mornings of May 28-30 to ascertain population size. Two to three counts of Naked Island will be made during this period, while the remaining areas will be surveyed once. These data will be used to determine whether the breeding populations at these islands are showing any signs of recovery from injury that incurred following the *Exxon Valdez* oil spill. Censuses will be conducted with Whalers piloted 100 m offshore.

All guillemots sighted onshore or in the water within 200 m of land will be counted, and their locations recorded.

Chick Diet and Delivery Rates:

Because adult guillemots carry single whole fish in their bills when provisioning their chicks, information on prey species composition can be readily obtained by making direct observations of active guillemot nests during chick-rearing. Observations will be made at selected groups of guillemot nests throughout the nestling period to collect diet and delivery rate data, and to characterize various aspects of adult foraging.

Productivity Parameters:

The following parameters will be determined from the monitoring of 40 guillemot nests at Naked Island:

Clutch Size[a] (eggs per nest with eggs)	
Lay Date[b]	
Incubation Period[a]	
Hatching Date[b]	
Mean Hatching Success[a] (% of eggs laid that hatch)	
Fledgling Success[a] (% of chicks hatched that fledged)	
Productivity[a] (average number of young fledged per nest attempt)	[a]mean
Nesting Success[a] (% of nests where at least 1 chick fledged)	[b]median

Chick Growth Rates**:**

A subset of the nests monitored for productivity will be used to assess chick growth and fledging mass. Chick growth rates provide a useful index of food availability. They also can demonstrate differences in the foraging proficiency of adult birds. Collection of these data are critical for comparisons with previous years and with other colonies in previous years. All accessible guillemot nests on Naked Island will be used for collecting growth rate and productivity data. All guillemot chicks that are handled will be banded (one USFWS metal band and three color plastic bands).

Capturing Adults:

At least 10 (and preferably more) adults will be captured to assess body condition, to band individuals for survival and diet studies, and to collect bio-samples. All adults captured will be individually marked with colored leg bands. Morphometric variables will be used to derive a condition index for adults during chick-rearing.

Adult Body Condition:

When adults are captured, their weight, wing length, outer primary length, tarsus, and culmen will be measured. Principle components analyses will be used to relate mass to body size for a determination of adult body condition.

Objective 3: Naked Island Guillemot Restoration Plan

If the results from Objective 1 indicate that mink on the Naked Island Archipelago are descendants of fur farm stock that were introduced, and mink predation remains a significant source of mortality for guillemot eggs,chicks, and nesting adults, then the restoration plan for Pigeon Guillemots in PWS should include removal of all mink from the Naked Island Archipelago. If the mink on Naked Island are genetically indistinguishable from mink on the mainland, and there are no records indicating that mink may have been introduced to Naked Island, plus mink predation is a major limiting factor for guillemot recovery in PWS, then the restoration plan could include population control or elimination of mink on the Naked Island Archipelago. Complete removal of the mink on the Naked Island Archipelago under this scenario would be dependant on the relative evaluation of guillemot restoration to a portion of their breeding range in PWS vs. allowing the mink population to self-regulate. If the mink on Naked Island are genetically distinct from mink on the mainland, but do not possess alleles associated with fur farm stock, then they may constitute a distinct population segment that has been reproductively isolated from the mainland long enough to evolve local adaptations to the environment on Naked Island. If these conditions pertain, it would be difficult to justify complete removal of mink from the Naked Island Archipelago as a restoration action for Pigeon Guillemots. In this circumstance, providing artificial nest sites for guillemots on Naked Island that are secure from mink (inaccessible to a terrestrial predator) may be the best available restoration action. Some combination of mink control and providing artificial secure nest sites for guillemots might a useful approach if mink appear to be native to the Naked Island Archipelago. Finally, the no action alternative is potentially the best course if the weight of evidence indicates that (1) mink are native to Naked Island, (2) that complete removal or population control of mink are not feasible, and/or (3) forage fish resources for guillemots nesting at Naked Island are currently the primary factor limiting recovery of guillemots. The issues that will decide the best plan to follow in restoring Pigeon Guillemots to PWS will depend not on the biological data gathered during the course of this study, but also the value that resource managers and society places on the recovery of Pigeon Guillemots from the EVOS.

Study Design and Statistical Analyses:

Study Design

Pigeon Guillemot at-sea survey methodology and design will remain identical to that of post-spill surveys conducted by the U. S. Fish and Wildlife We will use one 7.7 m fiberglass boat traveling at speeds of 10-20 km/hr to survey the end of May. For each survey, two observers will survey a sampling window 100 m on either side, ahead of, and above the vessel (Klosiewski and Laing 1994). When surveying shoreline transects, observers will also record sightings on land within 100 m of shore. Observers will sample continuously and use binoculars to aid in species identification. Observers will practice estimating distances with a duck decoy, and radars on the survey vessels will be used to assist in determining our distance from land on shoreline transects. We will survey most transects when wave height is <30 cm, and we will not survey when wave height is >60 cm.

Statistics

For most comparisons we will use general linear models (GLMs) to test for food quality effects. We will include “year” and “chick type” (separate categories designated for alpha, beta, and

single chicks) as categorical random factors in our GLMs when appropriate. For binomially-distributed data we will compare multiple logistic regression models, and test for significance by assessing the deviance (expressed as a likelihood ratio statistic) of saturated models and models lacking particular effects (Agresti 1990). For among year comparisons we will use individual year means as our sample units. We will use the Lilliefors test to assess normality with variables having continuous frequency distributions. If necessary we will perform transformations to satisfy assumptions of parametric tests; otherwise we will use non-parametric tests (Kruskal-Wallis or Mann-Whitney *U*). For all *t*-tests we assume unequal variance. For contingency table analyses, log-likelihood ratio tests (*G*-tests) will be used (Fienberg 1970, Bishop et al. 1975). For *G*-tests involving only two classes, the Williams correction will be applied to reduce the likelihood of type-1 errors (Sokal and Rohlf 1995). Mean values (1 SE) will be used when reporting results. All tests will be two-tailed, and statistical significance will be assigned at $P < 0.05$.

C. Contracts and Other Agency Assistance

The transport of equipment, supplies, and fuel to and from the field camps, plus winter mink trapping trips in the Sound, will be contracted to a local business operating within PWS.

Drs. Joseph Cook and Melissa Fleming, Museum of Southwestern Biology, University of New Mexico will lead the effort to identify the origin of mink on the Naked Island Archipelago using genetic analysis techniques. The analyses will be conducted in Dr. Cook's lab at UNM.

III. SCHEDULE

A. Project Milestones

Objective 1. Determine the feasibility of restoring the breeding population of Pigeon Guillemots on Naked Island using mink control.

To be met by 15 April 2009.

Objective 2. Determine whether the size and productivity of the breeding population of Pigeon Guillemots on Naked Island is limited by food supply.

To be met by 15 April 2009.

Objective 3. Design a restoration plan for the Pigeon Guillemot population on Naked Island that is feasible, effective, and associated with a reasonable cost-benefit ratio.

To be met by 15 April 2010.

B. Measurable Project Tasks

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed. This information will be

the basis for the quarterly project progress reports which are submitted to the Trustee Council Office. Please format your schedule like the following example.

FY 07, 2nd quarter (January 1 – March 31)
Project funding approved by Trustee Council

FY 07, 3rd quarter (April 1 – June 30)
Set up field camp on Naked Island (Cabin Bay), 10-25 May
Census breeding guillemots at Naked Island and nearby islands, 28-30 May
Collect field data on guillemot nesting success, predation rates by mink, brood size, chick growth rates, diet composition, fledgling mass.
Trap mink for genetics analysis
Request tissue samples from mink currently archived in collections

FY 07, 4th quarter (July 1 – September 30)
Collect field data on guillemot nesting success, predation rates by mink, brood size, chick growth rates, diet composition, fledgling mass.
Trap mink for genetics samples
Conduct laboratory analyses of previously collected mink genetic samples.

FY 08, 1st quarter (October 1 – December 31)
Enter, analyze, and interpret field data.
Conduct laboratory analyses of newly collected mink genetic samples.
Prepare for annual Marine Science Symposium

FY 08, 2nd quarter (January 1 – March 31)
Attend annual Marine Science Symposium and present results to peer reviewers
Trap mink in PWS for tissue samples to conduct genetics analyses (March)

FY 08, 3rd quarter (April 1 – June 30)
Set up field camp on Naked Island (Cabin Bay), 10-25 May
Census breeding guillemots at Naked Island and nearby islands, 28-30 May
Collect field data on guillemot nesting success, predation rates by mink, brood size, chick growth rates, diet composition, fledgling mass.
Trap mink for genetics samples
Conduct laboratory analyses of newly collected mink genetic samples.

FY 08, 4th quarter (July 1 – September 30)
Collect field data on guillemot nesting success, predation rates by mink, brood size, chick growth rates, diet composition, fledgling mass.
Continue laboratory analyses of previously collected mink genetic samples.
Completion of second and final field season of data collection on guillemots nesting on Naked Island

FY 09, 1st quarter (October 1 – December 31)

Enter, analyze, and interpret field data.
Conduct laboratory analyses of newly collected mink genetic samples.
Prepare for annual Marine Science Symposium

FY 09, 2nd quarter (January 1 – March 31)
Attend annual Marine Science Symposium and present results to peer reviewers
Trap mink in PWS for tissue samples to conduct genetics analyses (March)
Present to the Trustee Council preliminary recommendations for possible direct restoration
actions for guillemots on the Naked Island Archipelago
Potentially submit proposal to Trustee Council to initiate direct restoration actions for Pigeon Guillemots on the Naked Island Archipelago (?)

FY 09, 3rd quarter (April 1 – June 30)
Conduct laboratory analyses of newly collected mink genetic samples.
Complete MS thesis analysis and writing

FY 09, 4th quarter (July 1 – September 30)
Complete laboratory and statistical analyses of all mink genetic samples.
Defense of MS thesis
Present draft recommendations to Trustee Council on potential mink control or eradication on the Naked Island Archipelago

FY 10, 1st quarter (October 1 – December 31)
Prepare manuscripts from the MS student's thesis
Prepare for annual Marine Science Symposium
Begin removal of mink from the Naked Island Archipelago (?)

FY 10, 2nd quarter (January 1 – March 31)
Attend annual Marine Science Symposium and present final project results to peer reviewers
Continue removal of mink from the Naked Island Archipelago (?)

FY 10, 3rd quarter (April 1 – June 30)
Submit Final Report for project, 15 April 2010, including final recommendations for a Pigeon Guillemot Restoration Plan for Naked Island and central Prince William Sound.
Submission of manuscripts to peer-reviewed scientific journals.

C. Completion Date

The anticipated completion of this project will be April 15, 2010, at the end of CY 09. This will allow adequate time to complete data analysis, thesis preparation by the Masters student, and manuscript preparation and submission following the last field season in 2008 and completion of laboratory and data analyses in 2009. Depending on the results produced during the first two

years of the project, a proposal to renew funding and initiate active restoration management for guillemots may be submitted early in 2009.

IV. RESPONSIVENESS TO KEY TRUSTEE COUNCIL STRATEGIES

A. Community Involvement and Traditional Ecological Knowledge (TEK)

All community input is always welcome to our project, the proposal process is open and the PAG members and other members of local communities may comment on proposals. The findings of the study will be communicated to local communities through various means including the annual EVOS meeting, on the web, distribution of reports and of course the reports will always be available in the local libraries.

B. Resource Management Applications

The restoration research described in this proposal builds on research that was previously supported by the EVOS Trustee Council as part of the APEX and NVP projects that assessed factors limiting recovery of Pigeon Guillemot populations damaged by EVOS. It also reflects the findings of research at the Alaska SeaLife Center, funded by the Trustee Council, that investigated restoration options for Pigeon Guillemots, given the continued failure of this seabird species to show any signs of recovery from the EVOS. The proposed research approach seeks to lay the groundwork for direct restoration actions beginning in 2009 or 2010 that would target the recovery of Pigeon Guillemots in PWS. By assessing the current factors limiting guillemot productivity on Naked Island, subsequent restoration actions are far more likely to result in significant and long-term enhancement of Pigeon Guillemot populations in the EVOS area.

V. PUBLICATIONS AND REPORTS

The following publications are projected for this research project (this is a rough projection and by no means complete):

An annual report for each year of this project will be submitted by 15 April of the following year. The final report for this project will be submitted 15 April 2010. At least two manuscripts will be generated from this research, and all will be published in the peer-reviewed scientific literature. Each of these two manuscripts will address one of the three major objectives/hypotheses of this study: (1) guillemot population recovery on Naked Island, PWS is limited by nest predation by introduced mink, (2) availability of sand lance as prey for nesting guillemots on Naked Island is currently not limiting population recovery, and (3) mink removal from the Naked Island Archipelago is a feasible, justifiable, and effective method for restoring Pigeon Guillemots to central Prince William Sound. A portion of the final report will be excerpted from the thesis of the M.S. student on this project. This student will be strongly encouraged and directly assisted by the PIs to submit for publication in the peer-reviewed scientific literature the results from this research.

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Curriculum Vitae

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Education

B. S. Environmental Resource Management 1976	Pennsylvania State University
M. S. Wildlife Ecology 1982	Oregon State University
Ph. D. Biology 1992	University of California, Irvine

Recent Professional Experience

1999-2007	Alaska Seabird Coordinator, Migratory Bird Management, U.S. Fish and Wildlife Service
1993-1998	Marine Bird Monitoring Coordinator, Migratory Bird Management, U.S. Fish and Wildlife Service
1984-1992	Biologist, Migratory Bird Management, U.S. Fish and Wildlife Service

Committees

Alaska Region Representative, North American Colonial Waterbird Conservation Plan
Chair, Alaska Seabird Working Group
Chair, Circumpolar Seabird Group
Seabird Coordinator, Circumpolar Arctic Flora and Fauna (CAFF), Circumpolar Biodiversity Monitoring Network.
Past-Chair Pacific Seabird Group

Professional Societies

Ecological Society of America	American Ornithologists' Union
The Wildlife Society	British Ornithologists' Union
Pacific Seabird Group	Cooper Ornithological Society
Waterbird Society	Wilson Ornithological Society
Association of Field Ornithologists	

Honors, Awards, and Fellowships

Special Achievement Award, U.S. Fish &Wildlife Service, 1983, 1990-1995, 1997, 1998, 2000, 2002
Exceptional Service Award, *Exxon Valdez* Oil Spill, U.S. Fish and Wildlife Service, 1989
Tuition Fellowship, University of California, Irvine, 1987,1988
Dean's List University of California, Irvine 1986, 1987
Oregon State University, 1978, 1979, 1980
Pennsylvania State University 1975
Senatorial Scholarship, U. S. Senate, 1971

Graduate Students Supervised

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Education:

Ph.D., University of Pennsylvania, Philadelphia, Pennsylvania (Biology) 1986
Dissertation title: Diet and reproduction in high latitude plankton-feeding seabirds

M.S., University of Alaska, Fairbanks, Alaska (Wildlife Management) 1978
Thesis title: Behavioral patterns of barren-ground caribou of the Central Arctic Herd adjacent to the Trans-Alaska Pipeline

B.A., Antioch College, Yellow Springs, Ohio (Biology) 1974

Professional experience:

1995-present: Assistant Unit Leader
USGS - Oregon Cooperative Fish and Wildlife Research Unit
Associate Professor of Wildlife Ecology (Courtesy)
Department of Fisheries & Wildlife
Oregon State University, Corvallis, Oregon.

1992-1995: Assistant Unit Leader – Wildlife
Alaska Cooperative Fish and Wildlife Research Unit
Assistant Professor of Wildlife Ecology
Institute of Arctic Biology and Department of Biology & Wildlife
University of Alaska Fairbanks, Fairbanks, Alaska.

1988-1992: Assistant Professor of Zoology
Cooperative Wildlife Research Laboratory and Department of Zoology
Southern Illinois University, Carbondale, Illinois.

1986-1988: Director, GCM Wildlife Research Center, Mumford, New York
Adjunct Assistant Professor of Biology, University of Rochester, New York.

Recent teaching experience:

1997-2005 Instructor, Conservation Biology of Wildlife (FW 563), Oregon State University, Corvallis (alternate years)

1996-2006 Instructor, Nutrition and Energetics of Wildlife (FW 599), Oregon State University, Corvallis (alternate years)

Recent Major Competitive Grants and Awards:

2004-07 Research Grant, Walla Walla District, U.S. Army Corps of Engineers, "Evaluate the Impacts of Avian Predation on Salmonid Smolts from the Columbia and Snake Rivers," $958,000 (PI).

2003-05 Research Work Order, Portland District, U.S. Army Corps of Engineers, "Avian Predation on Juvenile Salmonids in the Columbia River Estuary," $306,000 (PI).

1997-2006 Research Grant, Bonneville Power Administration, "Avian Predation on Juvenile Salmonids in the Lower Columbia River," $3,325,000 (PI).

2003 Scientific Excellence Award, Cooperative Research Units, U.S. Geological Survey

2001 STAR Award, U.S. Geological Survey, U.S. Department of the Interior

2000-04 Research Work Order, "Populations, Productivity, and Food Habits of Seabirds Breeding on St. Lawrence Island, Alaska," $250,000 (PI).

2001-05 Research Work Order, "A Satellite Telemetry Study of the Endangered Short-tailed Albatross: Oceanic Habitat Selection, Foraging Behavior, and Potential Conflicts with Long-Line Fisheries," $250,000 (PI).

Selected Refereed Publications related to the proposed project:

2006 Assessing the nutritional stress hypothesis: relative influence of diet quanitity and quality on seabird productivity. (with P.G.R. Jodice, senior author, K.R. Turco, R.M. Suryan, D.B. Irons, J.F. Piatt, M.T. Shultz, D.G. Roseneau, A.B. Kettle, J.A. Anthony). Marine Ecology Progress Series 325:267-279.

2006 Differential response in chick survival to diet in least and crested auklets. (with A.E. Gall, senior author, D.B. Irons, I.C. Rose). Marine Ecology Progress Series 308:279-291.

2004 Foraging patterns of male and female double-crested cormorants in the Columbia River estuary. (with C.D. Anderson, senior author, K. Collis). Canadian Journal of Zoology 82:541-554.

2003 Quantifying the effect of predators on endangered species using a bioenergetics approach: Caspian terns and juvenile salmonids in the Columbia River estuary. (with D.E. Lyons, D.P. Craig, K. Collis, G.H. Visser). Can. J. Zool. 81:250-265.

2002 Long-term direct and indirect effects of the "Exxon Valdez" oil spill on pigeon guillemots in Prince William Sound, Alaska. (with G.H. Golet, P.E. Seiser, A.D. McGuire, senior authors, J.B. Fischer, K.J. Kuletz, D.B. Irons, T.A. Dean, S.G. Jewett, S.H. Newman). Marine Ecology Progress Series 241: 287-304.

2002 Response of pigeon guillemots to variable abundance of high-lipid and low-lipid prey. (with M.A. Litzow, J.F. Piatt, A.K. Prichard, senior authors). Oecologia 132:286-295.

2002 Short-term fluctuations in forage fish availability and the effect on prey selection and brood-rearing in the black-legged kittiwake (*Rissa tridactyla*). (with R.M. Suryan, D.B. Irons, M. Kaufman, P.G.R. Jodice, senior authors, J. Benson, E.D. Brown). Marine Ecology Progress Series 236:273-287.

2002 Does food availability affect energy expenditure rates of nesting seabirds? A supplemental-feeding experiment with Black-legged Kittiwakes (*Rissa tridactyla*). (with P.G.R. Jodice, senior author, S.A. Hatch, V.A. Gill, R.B. Lanctot, G.H. Visser. Canadian Journal of Zoology 80:214-222.

2000 Comparison of pigeon guillemot, *Cepphus columba*, blood parameters from oiled and unoiled areas of Alaska eight years after the *Exxon Valdez* oil spill. (with P.E. Seiser, L.K. Duffy, A.D. McGuire, senior authors, G.H. Golet, and M.A. Litzow). Marine Pollution Biology 40:152-164.

2000 Lipid content and energy density of forage fishes from the northern Gulf of Alaska. (with J.A. Anthony, senior author, K.R. Turco). Journal of Experimental Marine Biology and Ecology 248:53-78.

2000 Adult prey choice affects chick growth and reproductive success of Pigeon Guillemots. (with G.H. Golet, K.J. Kuletz, senior authors, D.B. Irons). Auk 117:82-91.

1997 Pigeon guillemots as a sentinel species: A dose-response experiment with weathered oil in the field. (with A.K. Prichard, senior author, R.T. Bowyer, L.K. Duffy). Chemosphere 35:1531-1548.

1997 Habitat use, diet and breeding biology of tufted puffins in Prince William Sound,

Alaska. (with J.F. Piatt, senior author, L. Henkel, K. Neuman). Northwestern Naturalist 78:102-109.

Professional Organizations and Service:

Chair – Pacific Seabird Group (2003 - 2005)

Curriculum Vitae --Joseph Anthony Cook

Education:

Western New Mexico University, Silver City
BS, Biology 1980
University of New Mexico, Albuquerque
M.S. 1982 Zoology; Ph.D. Biology, 1990

Professional Experience:

Present	Professor and Curator of Mammals, Biology Dept. and Museum of SW Biology, University of New Mexico
2000-2003	Chair and Professor of Biology, Biological Sciences, Idaho State University
1990-2001:	Curator of Mammals, University of Alaska Museum Assistant/Associate/Full Professor of Biology, University of Alaska Member, Biochemistry and Molecular Biology Program
1997:	Faculty Affiliate, Universidad Gabriel Rene Moreno, Santa Cruz, Bolivia
1993-1996:	Faculty Affiliate, Universidad de la Republica, Facultad de Ciencias, Montevideo, Uruguay
1993:	J. William Fulbright Fellowship (Uruguay)

Five Publications related to the proposed project:

Cook, J. A., N. G. Dawson, and S. O. MacDonald. 2006. Conservation of highly fragmented systems: the north temperate Alexander Archipelago. Biological Conservation. 133:1-15.

Cook, J. A., E. P. Hoberg, A. Koehler, S. O. MacDonald, H. Henttonen, L. Wickstrom, V. Haukisalmi, K. Galbreath, F. Chernyavski, N. Dokuchaev, A. Lahzuhtkin, A. Hope, E. Waltari, A. Runck, A. Veitch, R. Popko, E. Jenkins, S. Kutz, and R. Eckerlin. 2005. Beringia: Intercontinental exchange and diversification of high latitude mammals and their parasites during the Pliocene and Quaternary. Mammal Science 30:S33-S44.

Cook, J. A., A. Runck, and C. J. Conroy. 2004. Historical biogeography at the crossroads of the northern continents: molecular phylogenetics of red-backed voles (Rodentia: Arvicolinae). Molecular Phylogenetics and Evolution 30:767-777.

Lessa, E. P., J. A. Cook, and J. L. Patton. 2003. Genetic footprints of demographic expansion in North America, but not Amazonia, following the Late Pleistocene. Proceedings of the National Academy of Sciences, USA 100: 10331-10334.

Stone, K., R. Flynn, and J. Cook. 2002. Post-glacial colonization of northwestern North America by the forest associated American marten (*Martes americana*). Molecular Ecology 11:2049-2064.

Five other publications (of 99 total):

Runck, A., and J. Cook. 2005. Post-glacial expansion of the southern red-backed vole (*Clethrionomys gapperi*) in North America. Molecular Ecology 14:1445-1456.

Bidlack, A. L. and J. A. Cook. 2002. A nuclear perspective on endemism in the Alexander Archipelago, Alaska: the Prince of Wales Flying squirrel (*Glaucomys sabrinus griseifrons*). Conservation Genetics 3:247-259.

Weckworth B., S. Talbot, G. Sage, D. Person, and J. Cook. 2005. A signal for independent coastal and continental histories for North American wolves. Molecular Ecology 14:917-931.

Cook, J. A., and E. P. Lessa. 1998. Are rates of diversification in subterranean South American tuco-tucos (genus *Ctenomys*, Rodentia: Octodontidae) unusually high? Evolution 52:1521-1527

Cook, J. A., E. P. Lessa, and E. A. Hadly. 2000. Paleontology, phylogenetic patterns, and macroevolutionary processes in subterranean rodents. Pp. 332-369 *In* E. Lacey, J. L. Patton, and G. Cameron, eds. Life Underground: The Biology of Subterranean Rodents, University of Chicago Press.

Synergistic Activities

1) Curation of the University of Alaska Museum Mammal Collection until 2001 (>400% increase in size to 75,000 specimens)
2) Initiated and Curated the Alaska Frozen Tissue Collection until 2001 (>60,000 specimens--- third largest for wild mammals worldwide; average > 70 loans annually).
3) Associate Editor, Journal of Mammalogy 1999-2001
4) Instructed in Uruguay, Paraguay, and Bolivia on molecular approaches to conservation (since 1993).
5) Sponsored participation of 8 Native students (1 doctoral, 1 master's, 1 senior honors project) and several Latin American graduate and undergraduate students in my DNA lab.
6) Curation of the MSB Mammal Collection since 2003 (initiated web-based database and added 32,000 specimens to date)

Collaborators and Other Affiliations:

Post-doctoral Research Associates Supervised: **Dr. Angela Garcia**, **Dr. Sue Kutz**, **Dr. Janet Loxterman, Dr. Vadim Fedorov, Dr. Melissa Fleming**, **Dr**. **Maureen Small, Dr. Fernando Torres**

Graduate Students: **Suzette (Durall) Mouchaty**, M.S. (1993); **Ellen W. Lance**, M.S. (1995); **Doreen Parker**, M.S. (1996) ; **Chris Conroy**, Ph.D. (1998); **John Demboski**, Ph.D. (1999); **Karen Stone**, Ph. D. (2000); **Allison Bidlack**, M. S. (2000); **John Levino-Chythlook**, M.S. (2000); **Amy Runck**, M.S. (2001), Ph.D. (2006 co-advised); **Kurt Galbreath**, M. S. (2002), **Michael Lucid**, M. S. (2003), **Aren Eddingsaas,** M. S. (2003), **Eric Tomasik**, M. S. (2003), **Byron Weckworth** M. S. (2003), **Eric Waltari,** Ph. D. (2005), **Sandy Talbot,** Ph. D. (2006 co-advised), & **Guillermo D'Elia**, M.S. (1996-- ***Universidad de la Republica, Facultad de Ciencias, Montevideo***-co-advised w/ E. Lessa).

Currently, I have 7 graduate students at the University of New Mexico.

Undergraduate Honors Theses* or Research Projects Supervised:

1994- **James Wood** "Chromosomal Evolution in the Bolivian Spiny Rats"*
1996- **Randy Brown** "The Small Mammal Fauna of the Alaska Peninsula"*
1996- **Beverly Johnson** "Molecular systematics of the Red-backed Voles"*
1999- **Kalin Kellie** "Cranial variation in the Kodiak Brown Bear (*Ursus arctos*)"*

I have mentored several NSF sponsored REU projects through my lab. **Kirsten Bagne; Melanie Wike; Suzette Durall; Tom Seaton; Michael MacDonald; Rich Brenner; Joshua Fisher; Brandy Jacobsen; Kaycee Bell; Matt Duersch; Kebai Gamblin; Aaron Orme; Harmony Dancing Rain Spoonhunter, Krista Ortega, Andrea Chavez, Ben Edinger, Randle McCain**.

Collaborators within the last 48 months: Jerry Dragoo, Diane Goade, Vadim Fedorov, Missy Fleming, Elizabeth Hadly, Heikki Henttonen, Eric Hoberg, Dave Klein, Enrique Lessa, Steve MacDonald, Jorge Salazar-Bravo, Sam Telford, Terry Yates

My graduate advisor was Terry Yates. I held no post-doctoral positions.

Budget Justification
FY 2007-2009 – $649.7K

Project Title: Pigeon Guillemot Restoration Research in Prince William Sound

FY 07 = $317.0K (FWS $164.8K OSU $114.2K UNM $38.0K)

Personnel - Total Request: $84.4K

No personnel will be hired by the Trustee Agency, all personnel will be hired by the two contracting universities, Oregon State University (OSU) and University of New Mexico (UNM). A graduate student is needed to assist the project leader and will run the field portion of the project and will be responsible for the final report. We will need 3 biological technicians for four and a half months for the field portion of the project and to help with gear preparation/maintenance. A laboratory technician will be hired for four months to help with DNA analyses. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.

Request: (FWS $.0K OSU $68.4K UNM $16.0K)

Travel – Total Request: $24.2K

Most of the travel will be done by the contracting universities. Five people (Graduate Student, Biological Technicians, and CoPI) will be traveling from Oregon and one person will be traveling from New Mexico to Anchorage to Prince William Sound and will need approximately 20 nights of lodging in Anchorage before and after the field season. A truck/boat will make 2 round trips per year for two years. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.

Request: (FWS $1.0K OSU $20.2K UNM $3.0K)

Contractual – Total Request: $233.5K

A barge is required to transport gear and fuel to the Prince William Sound study site. If we cannot get Forest Service permission to camp on Naked Island we will have to live on a floating barge in Cabin Bay. To work in the winter time a support vessel will be contracted to provide lodging and food for 20 days. The boats will operate for hundreds of hours and will need repairs and replacement parts. There are also fees associated with launching and parking the boat in the harbors. Oregon State University will hire a graduate student and 3 biological technicians to do the field work and report writing. University of New Mexico will conduct all the DNA analyses to determine if the mink on Naked Island were introduced or not. ***Note the amounts shown below is the total and includes the amounts shown going to the universities under the other categories*** **(Linked from OSU = $114.2K; Linked from UNM = $38.0K; FWS Other = $81.3K).**

Commodities – Total Request: $40.6K

We will be conducting field work for 4 months in Prince William Sound and will use boats with gas motors and need gas and oil, food and miscellaneous camping gear. The DNA analyses require laboratory supplies that need to be purchaed. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.

Request: (FWS $27.6K, OSU $3.0K, UNM $10.0K)

Equipment – Total Request: $28.7K
We are using much USFWS equipment for this survey as in-kind contributions, but our outboard motors and inflatables are limited and one new one will have to be purchased. We also need to purchase a couple of binoculars and one computer because USFWS has run short.
Request: (FWS $28.7K OSU $0K UNM $0K)

Indirect – Total Request: $51.8K
We are using the standard 9% which the government agencies charge. OSU will charge 22% and UNM will charge 15%. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.
Request: (FWS $26.2K OSU $20.6K UNM $5.0K)

FY 08 = $284.3K (FWS $137.4K OSU $114.2K UNM $32.7K)

Personnel – Total Request: $84.4K
Same as FY 07 (reduced due to space limitations).
Request: (FWS $.0K OSU $68.4K UNM $16.0K)

Travel – Total Request $22.6K
Most of the travel will be done by the contracting universities. Five people (Graduate Student, Biological Technicians, and CoPI) will be traveling from Oregon and one person will be traveling from New Mexico to Anchorage to Prince William Sound and will need approximately 20 nights of lodging in Anchorage before and after the field season. A truck/boat will make 2 round trips per year for two years. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.
Request: (FWS $1.0K OSU $20.2K UNM $1.4K)

Contractual: Total Request = $228.2K
Same as FY 07 (reduced due to space limitations
(Linked from OSU = $114.2K; Linked from UNM = $32.7K; FWS Other = $81.3K)

Commodities – Total Request $27.6K
We will be conducting field work for 4 months in Prince William Sound and will use boats with gas motors and need gas and oil, food and miscellaneous camping gear. The DNA analyses require laboratory supplies that need to be purchased. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.
Request: (FWS $17.6K, OSU $3.0K, UNM $7.0K)

Equipment – Total Request $4.0K
Miscellaneous equipment will have to be replaced as it is damaged.
Request: (FWS $4.0K OSU $0.0K UNM $0.0K)

Indirect – Total Request $48.4K
We are using the standard 9% which the government agencies charge. OSU will charge 22% and UNM will charge 15%. Note that the request from OSU and UNM is duplicated in the

Contractual Request from the FWS.
Request: (FWS $23.5K OSU $20.6K UNM $4.3K)

FY 09 = $48.4K (FWS $4.0K OSU $44.4K UNM $.0K)

Personnel – Total Request $24K
No personnel will be hired by the Trustee Agency, all personnel will be hired by the two contracting universities, Oregon State University (OSU) and University of New Mexico (UNM). A graduate student is needed to assist the project leader and will run the field portion of the project and will be responsible for the final report. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.
Request: (FWS $.0K OSU $24.0K UNM $.0K)

Travel – Total Request $8.4K
Most of the travel will be done by the contracting universities. One person (Graduate Student) will be traveling from Oregon to Anchorage to Prince William Sound and to the annual conference. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.
Request: (FWS $.0K OSU $8.4K UNM $.0K)

Contractual – Total Request $44.4K
Oregon State University will hire a graduate student to do the field work and report writing. Note the amount shown below is the total and includes the amounts shown going to the universities under the other categories. **(Linked from OSU = $44.4K; Linked from UNM = $.0K; FWS Other = $.0)**

Commodities – Total Request $2.0K
This will cover miscellaneous costs of paper, printing, etc. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.
Request: (FWS $.0K, OSU $2.0K, UNM $.0K)

Equipment - $.0K
No Request for Equipment.

Indirect - $12.0K
We are using the standard 9% which the government agencies charge. OSU will charge 22% and UNM will charge 15%. Note that the request from OSU and UNM is duplicated in the Contractual Request from the FWS.
Request: (FWS $4.0K OSU $8.0K UNM $.0K)

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Budget Category:	Proposed FY 07	Proposed FY 08	Proposed FY 09		TOTAL PROPOSED	
Personnel	$0.0	$0.0	$0.0		$0.0	
Travel	$1.0	$1.0	$0.0		$2.0	
Contractual	$233.5	$228.2	$44.4		$506.1	
Commodities	$27.6	$27.6	$0.0		$55.2	
Equipment	$28.7	$4.0	$0.0		$32.7	
Subtotal	$290.8	$260.8	$44.4		$596.0	
General Administration (9% of subtotal)	$26.2	$23.5	$4.0		$53.7	
Project Total	$317.0	$284.3	$48.4		$649.7	
Other Resources: (Cost Shares)						

Cost-share Funds:
In this box, identify non-EVOS funds or in-kind contributions used as cost-share for the work in this proposal. List the amount of funds, the source of funds, and the purpose for which the funds will be used. Do not include funds that are not directly and specifically related to the work being proposed in this proposal.

In-kind contriibutions:
David B. Irons salary ($12K/month for 3 months) = $36K
Dan Roby salary ($12K/month for 3 months) = $36K
Joe Cook salary ($12K/month for 3 months) = $36K
Laboratory (space and instruments for DNA analyses) = $50K
Boat user fee (240 days @ $500/day) = $120k
Equipment user fee (computers, surival suits, electronics, etc.) = $12k
GSA vehicle user fee = $4k

Total = $294K

FY 07-09

Date Prepared:

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3A
TRUSTEE
AGENCY
SUMMARY

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
						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	Travel
Description	Price	Trips	Days	Per Diem	Sum
Truck and boat Anchorage to Whittier RT		2	10	100.0	1.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.0

FY 07

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3B
Personnel
& Travel
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Contractual Costs:	Contractual
Description	Sum
Barge run (set and take down camp) 2 trips x 6K	12.0
Living Barge ($200/dayx120 days)	24.0
Safety Training (4 people@$1200)	4.8
Boat maintenance and repair (Boston Whaler)	6.0
Telephone Services	1.0
Field equipment clean and repair	1.0
Inflatable Boat Repair	4.0
Harbor Fees	0.5
Vessel Charter (winter use) 10 days@$2500/day	25.0
Local Mink Trappers ($300/day X 10 days)	3.0
4A Linkage - Oregon State University	114.2
4A Linkage - New Mexico University	38.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$233.5

Commodities Costs:	Commodities
Description	Sum
Food (4 people x 120 days x $15)	7.2
Boat Fuel (40 Gals/day x 120 days x $ 3.00/Gal)	14.4
Misc. Camp Supplies	5.0
Rain gear, boots, gloves	1.0
Commodities Total	$27.6

FY 07

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife Irons

FORM 3B
Contractual & Commodities DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
Notebook Computer (1)			2.5
Binoculars (2)			2.0
Gps Units (2)			1.0
Boat Emergency Locator Beacon (2)			1.2
Inflatable Raft (1)			6.0
Outboard Motor (2)			5.0
Bird Capture Equipment			4.0
Mink Capture Equipment			3.0
Misc. Equipment			4.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$28.7

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency
Camping supplies	4	FWS
Survival suits	4	FWS
Float coats	4	FWS
Mustang suits	4	FWS
Binoculars	4	FWS
Telescopes	2	FWS
25" Boston Whaler	4	FWS
Inflatable Boat	1	FWS
All other misc gear	1	FWS
	4	FWS

FY 07

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3B
Equipment
DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
						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	Travel
Description	Price	Trips	Days	Per Diem	Sum
Truck and boat Anchorage to Whittier RT		2	10	100.0	1.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.0

FY 08

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3B
Personnel
& Travel
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Contractual Costs:	Contractual
Description	Sum
Barge run (set and take down camp) 2 trips x 6K	12.0
Living Barge ($200/dayx120 days)	24.0
Safety Training (4 people@$1200)	4.8
Boat maintenance and repair (Boston Whaler)	6.0
Telephone Services	1.0
Field equipment clean and repair	1.0
Inflatable Boat Repair	4.0
Harbor Fees	0.5
Vessel Charter (winter use) 10 days@$2500/day	25.0
Local Mink Trappers ($300/day X 10 days)	3.0
4A Linkage - Oregon State University	114.2
4A Linkage - New Mexico University	32.7

If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$228.2

Commodities Costs:	Commodities
Description	Sum
Food (4 people x 120 days x $15)	7.2
Boat Fuel (40 Gals/day x 120 days x $ 3.00/Gal)	14.4
Misc. Camp Supplies	5.0
Rain gear, boots, gloves	1.0
Commodities Total	$27.6

FY 08

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S Fish & Wildlife - Irons

FORM 3B
Contractual & Commodities DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
Misc. Equipment			4.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$4.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency
Camping supplies	4	FWS
Survival suits	4	FWS
Float coats	4	FWS
Mustang suits	4	FWS
Binoculars	4	FWS
Telescopes	2	FWS
25" Boston Whaler	4	FWS
Inflatable Boat	1	FWS
All other misc gear	1	FWS
	4	FWS

FY 08

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3B
Equipment
DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
						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	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY 09

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3B
Personnel
& Travel
DETAIL

Contractual Costs:	Contractual Sum
Description	
4A Linkage - Oregon State University	44.4
4A Linkage - New Mexico University	0.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$44.4

Commodities Costs:	Commodities Sum
Description	
Commodities Total	$0.0

FY 09

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3B
Contractual & Commodities DETAIL

EXXON VALDEZ **OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

New Equipment Purchases:		Number	Unit	Equipment
Description		of Units	Price	Sum
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
			New Equipment Total	$0.0

Existing Equipment Usage:		Number	Inventory
Description		of Units	Agency

FY 09

Project Number:
Project Title: Pigeon Guillemot
Agency: U.S. Fish & Wildlife - Irons

FORM 3B
Equipment
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Budget Category:	Proposed FY 07	Proposed FY 08	Proposed FY 09		TOTAL PROPOSED
Personnel	$68.4	$68.4	$24.0		$160.8
Travel	$20.2	$20.2	$8.4		$48.8
Contractual	$2.0	$2.0	$2.0		$6.0
Commodities	$3.0	$3.0	$2.0		$8.0
Equipment	$0.0	$0.0	$0.0		$0.0
Subtotal	$93.6	$93.6	$36.4		$223.6
Indirect (rate will vary by contractor) (22%)	$20.6	$20.6	$8.0		$49.2
Project Total	$114.2	$114.2	$44.4		$272.8

FY 07-09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4A
Non-Trustee
SUMMARY

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:				Months	Monthly		Personnel
	Name	Description		Budgeted	Costs	Overtime	Sum
	Graduate Student			12.0	3.0		36.0
	Biological Technician			4.5	2.4		10.8
	Biological Technician			4.5	2.4		10.8
	Biological Technician			4.5	2.4		10.8
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		25.5	10.2	0.0	
						Personnel Total	$68.4

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
	Travel from Oregon to Anchorage to Prince William Sound	1.0	5	21	0.2	9.2
	Travel from Oregon to Anchorage for Annual Conference	1.0	2	6	0.2	3.2
	Travel from Oregon to Anchorage to Prince William Sound (winter)	1.0	5	14	0.2	7.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$20.2

FY 07

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Personnel
& Travel
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Contractual Costs:	Contractual Sum
Description	
Misc.	2.0
Contractual Total	$2.0

Commodities Costs:	Commodities Sum
Description	
Misc.	3.0
Commodities Total	$3.0

FY 07

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Contractual & Commodities
DETAIL

EXXON VALDEZ **OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

New Equipment Purchases:		Number	Unit	Equipment
Description		of Units	Price	Sum
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
			New Equipment Total	$0.0

Existing Equipment Usage:	Number	
Description	of Units	

FY 07

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Equipment
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:				Months	Monthly		Personnel
	Name	Description		Budgeted	Costs	Overtime	Sum
	Graduate Student			12.0	3.0		36.0
	Biological Technician			4.5	2.4		10.8
	Biological Technician			4.5	2.4		10.8
	Biological Technician			4.5	2.4		10.8
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		25.5	10.2	0.0	
						Personnel Total	$68.4

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
	Travel from Oregon to Anchorage to Prince William Sound	1.0	5	21	0.2	9.2
	Travel from Oregon to Anchorage for Annual Conference	1.0	2	6	0.2	3.2
	Travel from Oregon to Anchorage to Prince William Sound (winter)	1.0	5	14	0.2	7.8
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$20.2

FY 08

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Personnel
& Travel
DETAIL

EXXON VALDEZ **OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

Contractual Costs:	Contractual
Description	Sum
Misc.	2.0
Contractual Total	$2.0

Commodities Costs:	Commodities
Description	Sum
Misc.	3.0
Commodities Total	$3.0

FY 08

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Contractual & Commodities
DETAIL

EXXON VALDEZ **OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

New Equipment Purchases:		Number	Unit	Equipment
Description		of Units	Price	Sum
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
			New Equipment Total	$0.0

Existing Equipment Usage:	Number	
Description	of Units	

FY 08

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Equipment
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:			Months	Monthly		Personnel
	Name	Description	Budgeted	Costs	Overtime	Sum
	Graduate Student		8.0	3.0		24.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	8.0	3.0	0.0	
					Personnel Total	$24.0

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
	Travel from Oregon to Anchorage to Prince William Sound	1.0	1	21	0.2	5.2
	Travel from Oregon to Anchorage for Annual Conference	1.0	2	6	0.2	3.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$8.4

FY 09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Personnel
& Travel
DETAIL

EXXON VALDEZ **OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

Contractual Costs:	Contractual
Description	Sum
Misc.	2.0
Contractual Total	$2.0

Commodities Costs:	Commodities
Description	Sum
Misc.	2.0
Commodities Total	$2.0

FY 09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Contractual & Commodities
DETAIL

New Equipment Purchases:	Number of Units	Unit Price	Equipment Sum
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
Indicate replacement equipment with an R.		**New Equipment Total**	$0.0

Existing Equipment Usage:	Number of Units	
Description		

FY 09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: Oregon State University

FORM 4B
Equipment
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Budget Category:	Proposed FY 07	Proposed FY 08	Proposed FY 09		TOTAL PROPOSED
Personnel	$16.0	$16.0	$0.0		$32.0
Travel	$3.0	$1.4	$0.0		$4.4
Contractual	$4.0	$4.0	$0.0		$8.0
Commodities	$10.0	$7.0	$0.0		$17.0
Equipment	$0.0	$0.0	$0.0		$0.0
Subtotal	$33.0	$28.4	$0.0		$61.4
Indirect (rate will vary by contractor) (15%)	$5.0	$4.3			$9.3
Project Total	$38.0	$32.7	$0.0		$70.7

FY 07-09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4A
Non-Trustee
SUMMARY

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:				Months	Monthly		Personnel
	Name	Description		Budgeted	Costs	Overtime	Sum
	Laboratory Technician			4.0	4.0		16.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		4.0	4.0	0.0	
						Personnel Total	$16.0

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
	Travel from New Mexico to Anchorage to Prince William Sound	1.0	1	10	0.2	3.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$3.0

FY 07

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Personnel
& Travel
DETAIL

Contractual Costs:	Contractual Sum
Description	
DNA Analyses	4.0
Contractual Total	$4.0

Commodities Costs:	Commodities Sum
Description	
Laboratory Supplies	10.0
Commodities Total	$10.0

FY 07

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Contractual & Commodities DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

New Equipment Purchases:		Number	Unit	Equipment
Description		of Units	Price	Sum
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
			New Equipment Total	$0.0

Existing Equipment Usage:	Number	
Description	of Units	
Laboratory use (space, instruments for DNA analyses)	1	

FY 07

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Equipment
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:				Months	Monthly		Personnel
	Name	Description		Budgeted	Costs	Overtime	Sum
	Laboratory Technician			4.0	4.0		16.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		4.0	4.0	0.0	
						Personnel Total	$16.0

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
	Travel from New Mexico to Anchorage to Prince William Sound	1.0	1	2	0.2	1.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1.4

FY 08

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Personnel
& Travel
DETAIL

Contractual Costs:	Contractual Sum
Description	
DNA Analyses	4.0
Contractual Total	$4.0

Commodities Costs:	Commodities Sum
Description	
Laboratory Supplies	7.0
Commodities Total	$7.0

FY 08

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Contractual & Commodities DETAIL

New Equipment Purchases:	Number of Units	Unit Price	Equipment Sum
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
		New Equipment Total	$0.0

Existing Equipment Usage:	Number of Units	
Description		
Laboratory use (space, instruments for DNA analyses)	1	

FY 08

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Equipment
DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07 - FY 09

Personnel Costs:				Months	Monthly		Personnel
	Name	Description		Budgeted	Costs	Overtime	Sum
							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	Travel
	Description	Price	Trips	Days	Per Diem	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$0.0

FY 09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Personnel
& Travel
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

Contractual Costs:	Contractual Sum
Description	
Contractual Total	$0.0

Commodities Costs:	Commodities Sum
Description	
Commodities Total	$0.0

FY 09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Contractual & Commodities DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07 - FY 09

New Equipment Purchases:		Number	Unit	Equipment
Description		of Units	Price	Sum
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
Indicate replacement equipment with an R.			**New Equipment Total**	$0.0

Existing Equipment Usage:	Number	
Description	of Units	

FY 09

Project Number:
Project Title: Pigeon Guillemot
Name of Contractor: University of New Mexico

FORM 4B
Equipment
DETAIL

Data Management and Quality Control Statement for Project Entitled:

Pigeon Guillemot Restoration Research in Prince William Sound

Note to EVOS Trustee Council:

All the data collected in this study will be archived in the North Pacific Seabird Monitoring Database or the North Pacific Pelagic Seabird Database. We have abided by the Federal Government Data Committee standards for metadata and we have created our metadata form (see below), I hope that will suffice for your metadata form.

David Irons

Study Design and Statistical Analyses:

Pigeon Guillemot survey methodology and design will remain identical to that of post-spill surveys conducted by the U. S. Fish and Wildlife We will use one 7.7 m fiberglass boat traveling at speeds of 10-20 km/hr to survey the end of May. For each survey, two observers will survey a sampling window 100 m on either side, ahead of, and above the vessel (Klosiewski and Laing 1994). When surveying shoreline transects, observers will also record sightings on land within 100 m of shore. Observers will sample continuously and use binoculars to aid in species identification. Observers will practice estimating distances with a duck decoy, and radars on the survey vessels will be used to assist in determining our distance from land on shoreline transects. We will survey most transects when wave height is <30 cm, and we will not survey when wave height is >60 cm.

Statistics

For most comparisons we will use general linear models (GLMs) to test for food quality effects. We will include "year" and "chick type" (separate categories designated for alpha, beta, and single chicks) as categorical random factors in our GLMs when appropriate. For binomially-distributed data we will compare multiple logistic regression models, and test for significance by assessing the deviance (expressed as a likelihood ratio statistic) of saturated models and models lacking particular effects (Agresti 1990). For among year comparisons we will use individual year means as our sample units. We will use the Lilliefors test to assess normality with variables having continuous frequency distributions. If necessary we will perform transformations to satisfy assumptions of parametric tests; otherwise we will use non-parametric tests (Kruskal-Wallis or Mann-Whitney *U*). For all *t*-tests we assume unequal variance. For contingency table analyses, log-likelihood ratio tests (*G*-tests) will be used (Fienberg 1970, Bishop et al. 1975). For *G*-tests involving only two classes, the Williams correction will be applied to reduce the likelihood of type-1 errors (Sokal and Rohlf 1995). Mean values (1 SE) will be used when reporting results. All tests will be two-tailed, and statistical significance will be assigned at $P < 0.05$.

Metadata Form:

Below is a copy of the North Pacific Pelagic Seabird Database metadata form which conforms to the FGDC standards.

IDENTIFICATION INFORMATION HELP

Abstract: Surveys conducted under the OCSEAP program.

Purpose: Surveys conducted under the OCSEAP program.

Supplemental Information:

DATA SET CREDIT INFORMATION

Last Name: DeGange
First Name: Anthony M.I. R.

CONTACT INFORMATION (ADDRESS ETC.)

Street 1:
Street 2
City:
State/Province
Zip/Postal Code:
Phone:
Email:
Fax:

SURVEY INFORMATION

Trip ID: FW7042
File Name: FNEW.145
Publication Date (YYYY/MM/D: 1997/04/24
Other Citation Details:

START DATE OF SURVEY (enter 9999, 99, 99 if unknown

Year (YYY: 1977 Month (MM): 06 Day (DD): 23

END DATE OF SURVEY (enter 9999, 99, 99 if unknown)

Year (YYY: 1977 Month (MM): 06 Day (DD): 26

BOUNDING COORDINATES (in decimal degrees)

North: 58.18278 South: 54.44167
East: -152.10000 West: -169.35972

OBSERVERS (if known)

Last Name		Last Name	
1:	DeGange	6	
2	Sowls	7	
3		8	
4		9	
5		10	

ADDITIONAL SURVEY INFORMATION

Survey Platform: Ship greater than 100 ft
Vessel Name: Surveyor
General Area: Western Gulf of Alaska + Bering Sea
Local Area: Kodiak to St. Matthew
Data Type: Discrete
Minimum Unit of Measure: 10 minute transect
General Survey Effort: Four day survey in Western G.O.A. and Bering Sea
# of Transect: 62
# of Station Count:
# of Observations: 62
Frequency of Survey: unknown

CURRENT PRINCIPAL INVESTIGATOR INFORMATION

Last Name: Piatt
First Name: John M.I: F.
Street 1: ABSC/USGS-BRD
Street 2: 1011 E. Tudor Rd.
City: Anchorage
State/Province: AK
Zip/Postal Code: 99503-
Phone: 907.786.3549
Email: john_piatt@usgs.gov
Fax: 907.786.3636

DATA USE RESTRICTION / CONTACT INFORMATION

Restrictions: Unrestricted
Last Name: Piatt
First Name: John

DATA QUALITY INFORMATION

Positional Accuracy:
Project Name: OCSEAP
Reference:
Reference:
General Comments:

Our data fit into your Taxonomic Sampling category. The fields associated with our data can be

found in the list below:

Lat., Lon, hour, minute, second, year, month, day, record number, type, distance, depth, species, number, behavior, side, transect, obs cond., weather, direction, wind, vessel, seas, in obs, out obs, salinity, air temp, water temp.

All data will be used as it was collected, that is not reduced, although species numbers will be averaged for the individual transects and will analyzed as discussed earlier in this section. Paradox or Access will be used with SAS to do analyses.