19.5.2

APEX: Alaska Predator Ecosystem Experiment in Prince William Sound and the Gulf of Alaska

Project Number:	97163 A-P
Restoration Category:	Research
Proposer:	David Cameron Duffy, Project Leader, University of Alaska Anchorage
Cooperating Agencies:	DOI, ADF&G, NOAA
Alaska SeaLife Center:	yes
Duration:	2 nd year of five-year project
Cost FY 97:	$ 2,185.8 K
Cost FY 98:	$2,259.6 K
Cost FY 99:	$2,196.4 K
Cost FY 00:	$176.4 K
Cost FY 01:	$0.0
Cost FY 02:	$0.0
Cost FY 03:	$0.0
Geographic Area:	Prince William Sound, Cook Inlet, Northern Gulf of Alaska
Injured Resource/Service:	Common Murre, Harbor Seal, Marbled Murrelet, Pacific Herring, Pigeon Guillemot.

ABSTRACT

This study will use seabirds as probes of the trophic (foraging) environment of Prince William Sound and will compare their reproductive and foraging biologies, including diet, with similar measurements from Cook Inlet, an area with apparently a more suitable food environment. These measurements will be compared with hydroacoustic and net samples of fish to calibrate seabird performance with fish distribution and abundance. This will allow us to determine the extent to which food limits the recover of seabirds from the *Exxon Valdez* oil spill. We will sample fish to compare diet, energetics and reproductive parameters of the different forage-fish species, to determine whether competitive and predatory interactions or different responses to the environment may be favoring the abundance of one fish species over another.

INTRODUCTION

The spill from the oil tanker *Exxon Valdez* resulted in significant mortality of several seabirds and in acute massive damage to Prince William Sound (PWS) and the Gulf of Alaska (GOA) (Piatt *et al.* 1990). Six years following the spill, several species have not recovered . This may be the result of lingering effects of the oil spill (toxicity of prey or sublethal effects of oil exposure to organisms). Other non-oil factors may also be involved, such as predation, climate-driven ecosystem changes, or even 'random' perturbations.

Both to aid in the recovery of injured resources and to safeguard the long-term health of Prince William Sound and the upper Gulf of Alaska, we need to understand the ecological processes that control the ecosystem. This project focuses on the trophic interactions of seabirds and the forage species they feed on. We chose food as the focus because: 1) much of seabird population theory and several empirical field tests have identified food as an important limiting factor (Ashmole 1963; Cairns 1989; Birt *et al.* 1987; Furness and Birkhead 1984); 2) seabird/fish researchers in the PWS/GOA complex have concluded that major changes in food have occurred during the period (Springer 1993; Anderson *et al.* 1994; Piatt and Anderson 1995); 3) other factors such as oil toxicity and climate change might express themselves through the food supply; and 4) knowledge of the forage prey base is critical for other apex predators, such as marine mammals and predatory fish (Pitcher 1980, 1981; Lowry *et al.* 1989), as well as for any larger effort to manage the marine resources of Prince William Sound and the Gulf of Alaska in a sustainable manner.

We propose to continue the study of the distribution and abundance of prey species through acoustic and net sampling in relation to food, environmental conditions and possible competitors, then to examine the physical, behavioral and competitive factors that limit access to these forage species for seabirds. We will examine the reproductive consequences of such limitations for pigeon guillemots *(Cepphus columba),* black-legged kittiwakes (*Rissa tridactyla),* tufted puffins (*Fratercula cirrhata),* common murres (*Uria aalge)* and cormorants (*Phalacrocorax* spp.).

By examining the diet and reproductive consequences for a surface-feeder (kittiwake), a benthic diver (pigeon guillemot), and two pelagic divers (puffin and murre), we should be able to build up a picture of the forage base for the entire seabird community, setting the stage for a long-term, low-cost monitoring program. The study will make between-year comparisons within sites and within-year comparisons between sites in Prince William Sound and Lower Cook Inlet, areas that have different food-availability. The comparisons between years will allow us to assess the degree of variability of different food regimes, while the between-site comparisons will allow us to assess the responses of seabird communities to these same regimes.

In addition, we will be using models to relate oceanographic and spatial features of Prince William Sound and the Gulf of Alaska to changes in seabird diet and population trends. Model types to be used include carbon-balance, energy-balance, patch-foraging, source-sink, and metapopulation.

This proposal should be read in conjunction with the FY 1996 Detailed Project Description, especially the appendices for the subprojects which describe the methods in greater detail. Changes in the methods and goals of this project are likely to occur as a result of what we learn during the 1996 field season, so it is important to remember that this document reflects a snapshot of an evolving project.

NEED FOR THE PROJECT

A. Statement of Problem

Numerous seabird species have declined between surveys in the 1970's and the 1990's in Prince William Sound: cormorants (*Phalacrocorax* spp.), kittiwake, glaucous-winged gull (*Larus glaucescens*), Arctic tern (*Sterna paradisaea*), Kittlitz's and marbled murrelets (*Brachyramphus brevirostris* and *B. marmoratus*), tufted and horned (*F. corniculata*) puffins, and pigeon guillemot (Agler *et al.* 1994 a,b; Klosiewski and Laing 1994). Colony trends for kittiwakes in Prince William Sound have been inconsistent, with colonies decreasing in the southern portion and increasing in the north (Irons unpubl. data). The population of pigeon guillemots in PWS has decreased from about 15,000 in the 1970's to about 3,000 in 1993 (Isleib and Kessel 1973; Sanger and Cody 1993). Based on censuses taken around the Naked Island complex, pre-spill counts were roughly twice as high as post-spill counts (Oakley and Kuletz 1993). Pigeon guillemots are listed as "Not recovering" in the 1994 *Exxon Valdez* Oil Spill Restoration Plan.

Common murres were among the species most damaged by the oil spill (Piatt *et al.* 1990), but most of the oiled birds nested outside PWS. Murres were also listed as "Not recovering" in the 1994 *Exxon Valdez* Oil Spill Restoration Plan, but have been upgraded to "recovering" because productivity has been normal since 1993 (Roseneau *et al.* 1995, 1996).

The best evidence for a shift in trophic resources for seabirds within Prince William Sound comes from pigeon guillemots. No long-term diet data sets exist for other species or, like black-legged kittiwakes, diet exhibits great year to year variability. In 1994, sand lance (*Ammodytes hexapterus*) accounted for only about 1% of prey items fed to guillemot chicks at Jackpot Island and about 8% at Naked Island ; in contrast, in 1979 the sand lance component at Naked Island was about 55% (Kuletz 1983; Oakley and Kuletz 1993). Gadids were much more prevalent in the diet of guillemot chicks on Naked Island in 1994 (ca. 30%) than they were in 1979-1981 (< 7%) (Kuletz 1983).

Pre-spill studies of pigeon guillemots breeding at Naked Island suggest that sand lance are preferred prey during chick-rearing (Kuletz 1983). 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 did breeding pairs that preyed mostly upon blennies and sculpins, at least in years when sand lance were readily available. Consequently, the overall productivity of the guillemot population was higher when sand lance were available.

The decline in the prevalence of 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. The schooling behavior of sand lance, coupled with their high lipid content relative to that of gadids and nearshore bottom fish, might make this species a particularly 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; Vermeer 1979, 1980; Monaghan *et al.* 1993) .

Initial field work in 1995 showed that sand lance burrow into sandy beaches in Prince William Sound where oil is still present (Duffy, pers. observ.). Sand lance spawn in the late winter and spring in sandy intertidal beaches and sandflats and their larvae occur in the top layers of inshore waters (McGurk and Warburton 1992), so that direct physical damage to sand lance breeding may have occurred and may be continuing. In addition, some sand lance populations may be dependent on particular estuaries (McGurk and Warburton 1992), so that damage to fish populations would have had only localized or checkerboard effects on seabird populations.

Similar patterns of damage may have occurred for the inshore-spawning herring (*Clupea pallasi*) and capelin (*Mallotus villosus*), important prey for seabirds (Baird and Gould 1985), with

persistent effects on seabirds.

Several other factors may be at work. The major shifts seen in the northern Gulf of Alaska and North Pacific (Springer 1993; Piatt and Anderson 1995) may have favored pollock (*Theragra chalcogramma*), also an important seabird food (Springer and Byrd 1989) which has become one of the most abundant forage fish species currently available to seabirds (Parks and Zenger 1979; Brodeur and Merati 1993; Haldorson unpubl. data). Pollock may be an important competitor or predator of other forage fish species and may have suppressed populations of these species. Similarly, other species pairs may overlap in diet, such as herring and sand lance (McGurk and Warburton 1992) or pink salmon (*Oncorhynchus gorbuscha*) and sand lance (Sturtevant 1995 and unpubl..), raising the possibility that reductions in the trophic role of one species may 'release' others from competition for food.

B. Rationale/Link to Restoration

Both scientific theory and common sense suggest that ecosystems change over time and that changes to one species or other component of the ecosystem may reverberate through the entire ecosystem (Pimm 1984; Wolfe and Kjerfve 1986). Such changes have occurred in the North Pacific and Gulf of Alaska (Hatch *et al.* 1993; Springer 1993; Piatt and Anderson 1995). Climate variations, fishing, or an oil spill may trigger changes that can take years to become apparent (Duffy 1993). Similarly, restoration efforts following the *Exxon Valdez* oil spill might increase injured species that are predators or competitors of other injured species, preventing their recovery several years after oil was removed as an immediate cause.. By studying only the species level, we may miss such effects. An ecosystem approach, such as the APEX study of the upper-trophic level predators of Prince William Sound, is designed to look for such indirect links and to improve our understanding of the ecological context lacking from single-species work (Wheelwright 1994). In conjunction with the Sound Ecology Assessment Project and the Nearshore Vertebrate Predators Project, ecosystem projects funded by the *Exxon Valdez* Oil Spill Trustee Council, APEX will give us a basic understanding of the ecological processes that may affect future changes in upper trophic levels that may in turn affect restoration efforts and also help us to determine when we have finally restored a sustainable and healthy Prince William Sound.

C. Location

The project will conduct field work in Prince William Sound and Lower Cook Inlet, with historical analyses covering the entire Northern Gulf of Alaska.

COMMUNITY INVOLVEMENT

Community involvement in this project will take several forms. In 1997, we plan to seek student interns from spill-area communities to participate in the island-based seabird projects. This will allow a direct interchange of information between researchers and the communities. Second, with the help of Martha Vlasoff, Spill Area-wide Coordinator for Project 96052, we will be requesting that the Village Facilitators and communities share their knowledge of past changes in distribution and abundance of seabirds and forage fish in the Sound, as well as their suggestions on why such changes have occurred. These may help us develop further hypotheses that can be tested during our field studies.

APEX produced an informational brochure which will be widely distributed. One article on the Project has appeared in the Trustee Council Newsletter, as has a radio piece on National Public Radio. We are also working with the Council to do a further series of short pieces as part of the

Council's efforts. Members also will participate in the International Symposium on the Role of Forage Fishes in Marine Ecosystems in Anchorage in 1996 and in the International Symposium on Changes in Pacific Seabirds in Asilomar, California in 1998. Several P.I.'s participated in the Pacific Seabird Group Oil spill seabird restoration workshop in Girdwood in September - October 1995 and will be helping to write up the summary text.

PROJECT DESIGN

A. Objectives

Each objective number also refers to the hypothesis of the same number below.

1. Summarize and interpret existing historical data on change in forage fish populations.

2. Determine whether differences in diet exist between forage fish species and determine the consequences at the individual and population level.

3. Determine the distribution of forage species in relation to oceanographic processes.

4. Productivity and size of forage species change the energy potentially available for seabirds.

5. Determine if forage fish characteristics (water depth, school density, prey size) and interactions among foraging seabirds (kleptoparasitism, aggression) determine access to prey or prey schools for different seabird species.

6. Determine if seabird foraging group size and species composition correlate with prey patch size.

7. a. Determine the degree of correlation between seabird diet composition and amount and the relative abundance and distribution of forage fish at relevant scales around colonies

   b. Determine the "relevant scales".

8. Determine if forage fish abundance predicts adult seabird foraging trips, chick meal-size and chick provisioning-rates.

9. Determine if differences in forage fish nutritional quality predict seabird reproductive productivity.

10. Determine if seabird species within a community react predictably to the different prey bases identified in Objective 1.

11. Determine if sand lance from beaches with persistent oil show signs of damage.

B. Methods

It is important to note that the methods presented here are overviews, details can be found in the individual descriptions of projects in the appendices. Also, APEX planning is extremely dynamic

and changes are likely to occur in response to oceanographic or other events such as storms, catastrophic predation at certain colonies, extreme shifts in prey distribution, or the results of the projects themselves.

General Hypothesis

A shift in the Prince William Sound marine trophic structure has prevented recovery of injured resources.

Working Hypotheses

1. The trophic structure of PWS has changed at the decadal scale.
2. Planktivory is the factor determining abundance of the preferred forage species of seabirds.
3. Forage fish species differ in their spatial responses to oceanographic processes.
4. Productivity and size of forage species change the energy potentially available for seabirds.
5. Forage fish characteristics and interactions among seabirds limit availability of seabird prey .
6. Seabird foraging group size and species composition reflect prey patch size.
7. Seabird diet composition and amount reflect changes in the relative abundance and distribution of forage fish at relevant scales around colonies.
8. Changes in seabird productivity reflect differences in forage fish abundance. as measured in adult seabird foraging trips, chick meal-size and chick provisioning-rates.
9. Seabird productivity is determined by differences in forage fish nutritional quality.
10. Seabird species within a community react predictably to different prey bases.
11. Continuing damage from oiling is restricting recovery of some forage fish species.

List of Projects

Project	PI	Short Title
a.	Haldorson	Fish population sampling
b.	Ostrand	Seabird foraging
c.	Sturtevant	Fish diets
d.	--	*not active in 1997*
e.	Irons/Suryan	Kittiwake foraging and reproduction
f.	Hayes	Guillemot foraging and reproduction
g.	Roby	Seabird reproduction and energetics
h.	Worthy	Proximate analysis
i.	Duffy	Project leader

j.	Roseneau	Barrens nesting study
k.	--	*not active in 1997*
l.	Piatt, Anderson & Blackburn	Historical analysis
m.	Piatt	Cook Inlet studies
n	Romano	Captive feeding
o.	McDonald	Statistical support
p.	Anderson	Sand lance oiling damage

Methods by Objective

The lead project with responsibility for coordinating data sharing is given in bold face.

1. *Summarize and interpret existing historical data on change in forage fish populations.*

   Initial work on archived data strongly suggests major changes in community structure and species abundance over the last several decades. **Project 97163 L** will use existing trawl and net sample data from NMFS and ADF&G to test for changes in forage fish communities over the last three decades.

2. *Determine whether differences in diet exist between forage fish species and determine the consequences at the individual and population level.*

   Initial data from 1994 and 1995 show significant overlaps in diet between forage fish species, suggesting the potential for competition which may be reflected by reciprocal body condition between species with high diet overlaps sampled together. **Project 97163 C** will examine diet differences, using fish samples provided by **97163 A,** which will also examine the condition of fish caught.

3. *Determine the distribution of forage species in relation to oceanographic processes.*

   Work in 1994 and 1995 indicated strong diurnal and depth components to the behavior of different fish species. **Project 97163 A** will use acoustic sampling, net surveys, and oceanographic sampling to determine whether certain fish species respond predictably to environmental conditions, such as depth, water temperature, distance offshore, or salinity. Inshore sampling will coordinate methods and logistics with the SEA and NVP projects.

4. *Productivity and size of forage species change the energy potentially available for seabirds .*

   The 1995 results suggest that body condition of fishes changes with size, species, and date.**Projects 97163 A, G and H** will examine this, A, using fish caught by sampling and G, using fish caught by birds, and H using both, to increase sample sizes.

5. *Determine if forage fish characteristics (water depth, school density, prey size) and interactions among foraging seabirds (kleptoparasitism, aggression) determine access to prey or prey schools for different seabird species.*

   Field work in 1995 suggested depth of prey, distance offshore and presence of other species affect the species' composition of seabird foraging flocks. **Project**

97163 B will examine foraging in relation to the data collected by Project 97163 A for Objective 3 above.

6. *Determine if seabird foraging group size and species composition correlate with prey patch size.*

   Initial results failed to show such a correlation in 1995, but **Project 97163 B** will continue to examine foraging in relation to the data collected by Project 97163 A for Objective 3 above.

7. *a. Determine the degree of correlation between seabird diet composition and amount and the relative abundance and distribution of forage fish at relevant scales around colonies .*

   At a meso-scale level, three Cook Inlet colonies in 1995 showed a correlation between food availability and seabird reproductive and foraging performance. The efforts in 1997 will be a joint project involving fish distribution data from 97163 A, foraging data from projects 97163 B and M, and diet data at colonies from projects 97163 E, F,G, J, M. Data will probably be examined within Cook Inlet and within PWS, as well as across all study sites. **Lead to be determined. Project 97163 I** will examine whether spatial distribution of colonies supports the subhypothesis that colony size and distribution are determined by food limitation.

   b. Determine the "relevant scales".

   Spatial scales will be determined from shipboard transects (Projects 97163 B and M) and radiotracking (Project 97163 E) of seabirds and from repeated sampling of fish ((97163 A and M); temporal scales will be determined retrospectively from the times over which diet and growth of seabirds (Projects 97163 E, F,G, J, M) and distribution and abundance of fish (Projects 97163 A and M) change. **Project 97163 O.**

8. *Determine if forage fish abundance predicts adult seabird foraging trips, chick meal-size and chick provisioning-rates.*

   This will be a joint project involving fish distribution data from 97163 A, foraging data from projects 97163 B and M, and diet data at colonies from projects 97163 E, F, G, J, M. **Projects 97163 I, O will coordinate.**

9. *Determine if differences in forage fish nutritional quality predict seabird reproductive productivity.*

   The 1995 field data show significant differences in diet quality and growth of seabirds based on differences in forage fish taken. Data on fish-provisioning rates, growth, and diet of wild birds from projects 97163 E, F, J, and M will be provided to **Project 97163 G** to test this. In addition, **Project 97163 N** will use fish provided by 97163 M to undertake captive rearing of kittiwakes and puffins as an independent test of the field results.

10. *Determine if seabird species within a community react predictably to the different prey bases identified in Objective 1.*

This objective will be examined between three sites in Cook Inlet by Projects **97163 M** and 97163 J and between these sites and Prince William Sound by these projects and 97163 E and 97163 F. Within species, **Projects 97163 E**, J, and M will examine kittiwake response, and **97163 F** and M will compare pigeon guillemots, **Projects 97163 J** and M will compare common murres. Data on fish distributions will be provided by projects 97163 A and M.

11. *Determine if sand lance from beaches with persistent oil show signs of damage.*

Project 97163 P compares biochemical evidence of damage of sand lance from two beaches with persistent oiling from the *Exxon Valdez* spill and from two unoiled beaches.

In addition, **Project 97163 O** will assist with design and analysis of all projects. **Project 97163 I** will begin planning for an international symposium on changes in Pacific seabirds, to be held at Asilomar, California in 1998 and for a session at the 1987 AAAS Arctic Science meeting.

C. Cooperating Agencies, Contract, and other Agency Assistance

Details of the responsibility of each agency and contracts with the private sector and with other government agencies can be found in the appendices describing individual subprojects in the FY 96 Detailed Project Descriptions.

SCHEDULE

A. Measurable Project Tasks for FY 97

1997

July	Acoustic sampling in PWS and LCI
November	Revise hypotheses
	Presentations at International Forage Fish Conference

1998

April	Second annual report

B. Project Milestones and Endpoints

Annual reports and publications from individual subprojects in the literature will constitute the main milestones. A series of synthesis papers will be produced later in the project.

1997	Arctic Science Conference, American Association for the Advancement of Science
1998	*International Symposium on Changes in Pacific Seabirds*, sponsored by the Pacific Seabird Group at Asilomar, California.
1999	*Symposium on Ten Years of Recovery Following the Exxon Valdez Oil Spill.*
2000	Monitoring Plan for Seabirds an Fish in the Restoration Area
2001	Final Reports completed

C. Completion Date

September 30, 2001

PUBLICATIONS AND REPORTS

This list is highly dynamic and publications will change titles, authors, and potential journals as they evolve.

97163 A

1. Sturdevant and Haldorson. Diet overlap, prey selection, diel feeding periodicity and food competition among forage fish species collected in nearshore and offshore habitats in PWS, Alaska. (APEX 95163 C)

2. Relationship between forage fish abundance and kittiwake foraging behavior and reproductive performance. *Condor.* Irons, Suryan, Coyle, Haldorson. March 2000.

3. J. Boldt. A comparison of growth, condition, energy and lipid content of juvenile pollock and herring among areas in Prince William Sound. M.S. thesis.

97163 B

1. Maniscalco, J. M. and W. D. Ostrand. June 1996. Behavior of seabirds in foraging flocks in Prince William Sound, Alaska. *Auk.*

2. Ostrand, W. D., G. Drew, R. Suryan, and D. B. Irons. July 1996. Randomization evaluations of telemetry and transect data on black-legged kittiwakes. *J. Field Ornithol.*

3. Ostrand, W. D., K. Coyle, G. Drew, D. Thorne, L. Haldorson, and D. B. Irons. October 1996. Resource selection by seabirds in Prince William Sound, Alaska. *Auk.*

4. Maniscalco, J. M., W. D. Ostrand, K. Coyle, D. Thorne, L. Haldorson, and D. B. Irons. Mar. 1997. Characteristics of forage fish schools preyed upon by seabird foraging flocks in Prince William Sound, Alaska. *Condor.*

5. Ostrand, W. D. and J. M. Maniscalco. June 1997. Marbled Murrelets as the catalyst in the formation of foraging flocks in Prince William Sound, Alaska. *Wilson Bull.*

6. Ostrand, W. D., K. Kuletz ,and D. B. Irons. Mar 1988. Structural characteristics of sites associated with repeated foraging by black-legged kittiwakes and marbled murrelets in Prince William Sound, Alaska. *Condor.*

7. Managing food for seabirds. In Restoration techniques. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

97163 C

1. Willette and Sturdevant. Diet overlap of forage fish during spring and summer, 1994 in Prince William Sound, Alaska. (from 94163 C)

2. Sturdevant and Willette. Incidence of gelatinous prey in the diets of juvenile chum salmon in Prince William Sound, Alaska. (note based on 94163 C)

3. Sturdevant. Size-related changes in the diets of forage fish.

4. Sturdevant. Food habits of juvenile prowfish, *Zaprora silenius*, in Prince William Sound, Alaska. (multiple years)

5. Sturdevant and Haldorson. Diet overlap, prey selection, diel feeding periodicity and food competition among forage fish species collected in nearshore and offshore habitats in PWS, Alaska. (APEX 95163 C)

6. Sturdevant. Food habits of nearshore demersal fish species in PWS (APEX 95163 C; note?)

7. Sturdevant. Seasonal changes in diet overlap of forage fish species.(94163 C and 95163 C)

97163 D

1. Piatt, J., L. Henkel, and M. Romano. Growth and diets of nestling Tufted Puffins on Seal Island, Alaska. *Northwest Naturalist.* to be submitted in 1996.

97163 E

1. Foraging area fidelity and tidal rhythms of individual seabirds. (revision of diss. chapter). *Ecology*, Irons. March 1996.

2. Flexible foraging behavior in seabirds: short-term buffer and long-term tradeoff. (revision of diss. chapter). *Animal Behav.*, Irons. April 1996.

3. The role of food availability in black-legged kittiwake sibling aggression and brood reduction. (revision of diss. chapter). *Col. Waterbirds*, Irons. May 1996.

4. Cost of chick-rearing in black-legged kittiwakes. *Ecology,* Golet, Irons, Estes. June 1996.

5. Changes in populations and productivity of black-legged kittiwakes and cormorants at Chiniak Bay, Kodiak, AK, 1975-1995. *Col .Waterbirds*, Seiser and Irons. June 1996.

6. Changes in marine bird demographics in PWS, AK: evidence of an ecosystem shift. *Auk.* Irons, Kuletz, Duffy, Piatt. Nov. 1996.

7. Changes in black-legged kittiwake productivity in the GOA: evidence of an ecosystem shift or oil spill effect? *Condor.* Irons, Suryan, Hatch, Slater. Jan. 1997.

8. Kittiwakes in PWS before and after the EVOS. *Condor.* Irons. Feb 1997.

9. Kittiwakes as indicators of food availability. *Condor.* Irons, Suryan, March 1997.

10. Foraging trip length as an indicator of food availability. *J. of Field Ornith.* Suryan, Irons March 1997.

11. Changes in colony attendance related to nest contents. *J. of Field Ornith.* Suryan and Irons. March 1997.

12. The relationship between diet and productivity in the black-legged kittiwake. *Condor.* Suryan, Irons, Roby. Nov 1997.

13. Population models and kittiwake in PWS, AK: effect of colony size and productivity fluctuations on overall population trends. *J. of Wildlife Management.* Suryan. Irons, Dec

1997.

14. Kittiwakes in PWS: food and habitat limitations. ?? Irons, Duffy, (Duffy, Irons) Suryan. ?? 1997.

15. A comparison of diets between flock and singly-foraging kittiwakes. *Col. Waterbirds,* Irons, Suryan, Ostrand March 1998

16. Habitat selection of foraging black-legged kittiwakes. *Condor* . Suryan, Irons, Ostrand. Dec 1998.

17. Effects of age on foraging and reproductive behavior in the kittiwake. Irons. March 1999.

18. Scales of variation in productivity and size of Gulf of Alaska black-legged kittiwake colonies. *Condor.* Irons, Suryan, Hatch, Piatt, Slater. Nov 1999.

19. Recruitment of kittiwakes to colonies in PWS: metapopulation models and sources versus sinks. ?,Suryan Irons, ? March 2001

20. Change in kittiwake productivity in PWS, AK: a test of the river/lake hypothesis. ?, Irons Duffy, Cooney, ???

21. Relationship between forage fish abundance and kittiwake foraging behavior and reproductive performance. *Condor.* Irons, Suryan, Coyle, Haldorson. March 2000.

22. Genetic structure of kittiwakes in the GOA. ?, Suryan, Irons, Hatch, Byrd, Piatt?

23. Observations of predation at PWS kittiwake colonies. *Colonial Waterbirds.* Suryan and Irons.

24. Managing human impacts.In Restoration techniques. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

25. Monitoring activities associated with other EVOS species or habitats. in Recommendations to the EVOS Trustee Council. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

97163 F

1. Changes in Pigeon Guillemot diets in Prince William Sound: 1979-1995. Hayes and Kuletz *Condor.* March 1997.

2. Changes in Pigeon Guillemot demographics in Prince William Sound: evidence of a decline in schooling forage fish. *Condor.* Hayes, Kuletz, March 1997

3. Relationship between diet specialists and prey availability in Pigeon Guillemots. *Condor.* Hayes. March 1997.

4. The effects of prey availability on Pigeon Guillemot colony productivity. *Auk.* Hayes, Roby. March 1998

5. Is pigeon guillemot colony size limited by the abundance of schooling fish? Hayes, Roby,

and Piatt. *Auk.* March 1999

6. The use of nest boxes by pigeon guillemots in Prince William Sound, Alaska. Hayes. *Journal of Field Ornithology.* March 1999

8. Pigeon Guillemots. in Recommendations to the EVOS Trustee Council. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

9. Increased predation at pigeon guillemot nest sites on Naked Island, Prince William Sound, Alaska. Hayes and Kuletz. *Colonial Waterbirds.* September 1996

97163 G

1. Managing human impacts.In Restoration techniques. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

2. Pigeon Guillemots. in Recommendations to the EVOS Trustee Council. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

3. Anthony, J. and D. D. Roby. subm. in 1997. Lipid content and energy density of forage fishes used by breeding seabirds in the northern Gulf of Alaska. *Comp. Biochem. Physiol.*

4. Anthony, J., D. L. Hayes, D. D. Roby, and ?. subm. 1998. Diet and reproduction in pigeon guillemots from Prince William Sound and Kachemak Bay, Alaska. *Condor.*

5. Anthony, J., D. B. Irons, R. Suryan and D. D. Roby. subm. 1998. Diet and reproduction in black-legged kittiwakes from Prince William Sound, Alaska. *Auk.*

6. Anthony, J., D. D. Roby, J. Piatt and D. C. Duffy. subm. 1999. Effects of diet quality on reproductive success of piscivorous seabirds in Alaska. *Ecology.*

7. Anthony, J., D. D. Roby, D. B. Irons, D. C. Duffy. subm. 1999. Prey exploitation by piscivorous seabirds in Prince William Sound, Alaska: a bioenergetics approach. *Can. J. Zool.*

8. Anthony, J., D. D. Roby, J. Piatt, D. C. Duffy. subm. 2000. Food as a constraint on seabird reproduction: relative importance of quantity and quality. *Amer. Zool.*

9. Duffy, *et al.* 2000. Seabird/forage fish interactions in the area of the *Exxon Valdez* oil spill area: a synthesis. *Science* or *Nature.*

97163 H

All results of this study will be incorporated into a series of peer-reviewed journals by participants of APEX, NVP, harbor seal, killer whale, and SEA projects. As the project has yet to begin, further details are not available.

97163 I

1. Managing food for seabirds. In Restoration techniques. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

2. Duffy, Irons, Michaelson, Mendenhall. 1997. Is food limiting for seabirds in Prince William Sound, Alaska? A test of several models of colony distribution.

3. Duffy. 1999. Changes in Pacific seabird populations: an overview. In Two Decades of Change in Pacific Seabirds.

97163 J

1. Roseneau *et al.* Predation of common murres by bald eagles *(Haliaetus leucocephalus)* at the Barren Islands seabird colonies. December-January 1996-1997 submission. *Journal of Raptor Research* or *Condor.*

2. Roseneau *et al.* The occurrence of albinism in Barren Island common murres and other murre populations in Alaska. January-February 1997. *Condor* or Wilson *Bulletin.*

3. *Common Murres.* in Recommendations to the EVOS Trustee Council. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

4. Roseneau, Kettle, Byrd. Productivity and chick diets of common murres and black-legged kittiwakes at the Barren Islands, Alaska, 1993-1999. Subm. 2000.

5. Kettle, A. B., P. D. Boersma, and M. A. Blanding. (proposed authors and title, contingent upon confirmation with second author). Differences in prey fed to tufted puffin chicks durin gthe late 1970's and early 1990's at East Amatuli island, Alaska. subm. International Symposium on the Role of Forage Fishes in Marine Ecosystems. Anchorage, 13-15 November 1996. The Alaska Sea Grant College Program.

6. Kettle, Boersma, Blanding, +? (proposed authors and title, contingent upon confirmation with second author) Growth rates of tufted puffin chicks during 1976-1982 and 1990-1995 at East Amatuli Island, Alaska. subm.1997.

97163 K

1. Roseneau and Byrd. Using Pacific Halibut to sample the availability of forage fish to seabirds. International Symposium on the Role of Forage Fishes in Marine Ecosystems. Anchorage, 13-15 November 1996. The Alaska Sea Grant College Program.

97163 L

1. Bechtol, W. R. 1996. Changes in forage fish populations of Kachemak Bay, Alaska, during 1976 to 1995. International Symposium on the Role of Forage Fishes in Marine Ecosystems. Anchorage, 13-15 November 1996. The Alaska Sea Grant College Program.

2. Blackburn, J. E. and P. J. Anderson. 1996. Growth, distribution, and availability of Pacific sand lance (*Ammodytes hexapterus* Pallas) in the Kodiak-Cook Inlet area of Alaska. International Symposium on the Role of Forage Fishes in Marine Ecosystems. Anchorage, 13-15 November 1996. The Alaska Sea Grant College Program.

3. Anderson, P. J. and J. E. Blackburn. 1996. Relative abundance of capelin (*Mallotus villosus*) in the Gulf of Alaska. International Symposium on the Role of Forage Fishes in Marine Ecosystems. Anchorage, 13-15 November 1996. The Alaska Sea Grant College Program.

97163 M

1. Marbled Murrelets. in Recommendations to the EVOS Trustee Council. in EVOS Restoration Workshop Final Report (Project 95038) and planned book.

2. Identifying species or populations requiring restoration. in EVOS

Restoration Workshop Final Report (Project 95038) and planned book.

3. Robards, M. and J. Piatt. Changes in nearshore fish communities in lower Cook Inlet, Alaska, between 1976 and 1995. For subm.to *Fisheries Biology* in 1996.

4. Piatt, J., T. van Pelt, S. Zador and B. Keitt. Response of seabirds to geographic variation in forage fish availablity in Cook Inlet, Alaska. For subm. to *Marine Ecology Progress Series* in 1996.

96163 N

1. Romano, M., D. D. Roby and J. Piatt. subm. 1998. Effects of prey type and quality on postnatal growth and development of piscivorous seabirds: a captive feeding experiment. *Physiol. Zool.*

97163 0

No separate papers are planned, as this subproject provides statistical support for other projects.

97163 P

1. Anderson, Bothner *et al.* Oil continues (?) to damage a critical forage fish in Prince William Sound eight years after the Exxon Valdez oil spill. *Nature*?

PROFESSIONAL CONFERENCES

Project-level participation

Several of the APEX P.I.'s (Piatt, Duffy, Hayes, Irons, Ostrand, Roby, Suryan) are involved in the writing-up of the *results of the Exxon Valdez Oil Spill Seabird Restoration Workshop* (95038), held in Girdwood in 1996. All Principal Investigators (Projects 97163 A-P) will attend the annual (January 1998) *Exxon Valdez* Restoration Workshop in Anchorage. In fall 1997, some will be participating in the *International Symposium on the Role of Forage Fishes in Marine Ecosystems* to be held in Anchorage on 13-15 November 1996. In fall 1997, some of the projects will be presented in a session to be held at the AAAS Arctic Science Conference. In 1998, the Project Leader will be convenor and several P.I.'s will be participants in the *International Symposium on Changes in Pacific Seabirds*, sponsored by the Pacific Seabird Group at Asilomar, California. Finally, APEX will present one or more sessions of integrated presentations at the 1999 *Symposium on Ten Years of Recovery Following the Exxon Valdez Oil Spill.*

Sub-project level participation

97163 A

Haldorson will attend the International Symposium on the Role of Forage Fishes in Marine Ecosystems to be held in Anchorage on 13-15 November 1996.

97163 B

For the International Symposium on the Role of Forage Fishes in Marine Ecosystems to be held in Anchorage on 13-15 November 1996: Ostrand, W. D., K. O. Coyle, G S. Drew, J.M. Maniscalco, and D. B Irons. Resource Selection by Seabirds in Prince William Sound, Alaska; Maniscalco, J. M. and W. D. Ostrand. Seabird Behaviors at Forage Fish Schools in Prince William Sound, Alaska. For the Pacific Seabird Group meeting in 1997: Ostrand, W. D., G. S. Drew, R. Suryan, and D. B. Irons. Randomization Comparisons of Transect and Radio Telemetry Data on Black-legged Kittiwakes; and Maniscalco, J. M. and W. D. Ostrand. Behavior

of Seabirds within Foraging Flocks in Prince William Sound, Alaska. For the meeting on 10 Years After the Spill Meeting: Ostrand, W. D. Seabird/Forage Fish Interactions 10 years after the TV *Exxon Valdez* Oil Spill.

97163 C
The P.I. will attend the late fall Forage Fish Symposium in Anchorage. Mark Willette is presenting our data from Forage Fish Diet Overlap 94163 C. Potentially, the P.I. would attend the 1997 Pink and Chum Salmon Workshop and present the same thing from the salmon perspective.

97163 D
This project will not be active in FY 97 so no conference attendance is planned.

97163 E
For the International Symposium on the Role of Forage Fishes in Marine Ecosystems to be held in Anchorage on 13-15 November 1996: Kuletz, K., D. Irons, J. Piatt and D. Duffy. Long-term changes in populations and diets of piscivorous birds and mammals in Prince William Sound, Alaska, reflect a shift in prey species abundance. For the next Pacific Seabird Group meeting: Changes in black-legged kittiwake productivity in the GOA: evidence of an ecosystem shift? by Irons Suryan, Hatch, Slater; and for the EVOS Tenth-year symposium in 1999: Kittiwakes in PWS before and 10 years after the EVOS by Irons.

97163 F
International Symposium on the Role of Forage Fishes in Marine Ecosystems / Nov 13-15, 1996 / Anchorage, AK / Decline of pigeon guillemot populations in Prince William Sound, Alaska, and apparent changes in distribution and abundance of their prey.

Pacific Seabird Group (24 th Annual Meeting) / Jan or Feb, 1997 /Portland, OR / Decline of pigeon guillemot populations in Prince William Sound, Alaska, and apparent changes in distribution and
abundance of their prey. (Note that this will include data from the 1996 field season)

97163 G
For the International Symposium on the Role of Forage Fishes in Marine Ecosystems to be held in Anchorage on 13-15 November 1996: Anthony and Roby. Proximate analysis of Prince William Sound forage fish.

97163 H
The P.I. will present results of this project at the Biennial Conference on the Biology of Marine Mammals, Monaco, February 1988.

97163 I
The Project Leader will attend Pacific Seabird Group meetings to inform the research community of general APEX progress. He is also planning a tentative APEX Session for the October AAAS Arctic Science Conference in fall 1997. For 1998, he is the convenor for the International Symposium on Changes in Pacific Seabirds, sponsored by the Pacific Seabird Group at Asilomar, California. He will also organize one or more sessions of APEX presentations for the 1999 *Symposium on Ten Years of Recovery Following the Exxon Valdez Oil Spill.*

97163 J
Project results from the FY 95 Barren Islands field season will be presented at a poster session during the Alaska Bird Conference on 8-10 April 1996. Also Kettle, A. B., P. D. Boersma, and M. A. Blanding. (proposed authors and title, contingent upon confirmation with second author).

Differences in prey fed to tufted puffin chicks durin gthe late 1970's and early 1990's at East Amatuli island, Alaska. subm. International Symposium on the Role of Forage Fishes in Marine Ecosystems. Anchorage, 13-15 November 1996. The Alaska Sea Grant College Program.

97163 K
Results will be presented at the upcoming International Symposium on the Role of Forage Fishes in Marine Ecosystems to be held in Anchorage on 13-15 November 1996.

97163 L
Three presentations will be given at the International Symposium on the Role of Forage Fishes in Marine Ecosystems to be held in Anchorage on 13-15 November 1996: 1) Bechtol, W. R. 1996. Changes in forage fish populations of Kachemak Bay, Alaska, during 1976 to 1995; 2) Blackburn, J. E. and P. J. Anderson. 1996. Growth, distribution, and availability of Pacific sand lance (*Ammodytes hexapterus* Pallas) in the Kodiak-Cook Inlet area of Alaska; and, 3) Anderson, P. J. and J. E. Blackburn. 1996. Relative abundance of capelin (*Mallotus villosus*) in the Gulf of Alaska.

97163 M
Three presentations will be given at the International Symposium on the Role of Forage Fishes in Marine Ecosystems to be held in Anchorage, 13-15 November 1996: 1) Piatt, J.F., D.C. Schneider, and D.A. Methven. Predator-Prey Dynamics in a Coastal Ecosystem; 2) Piatt, J.F., Seabird and Forage Fish Interactions in the Gulf of Alaska; 3) Byrd, G.V, R. Merrick, J. Piatt, and B. Norcross. Seabird, Marine Mammal, and Oceanography Coordinated Investigations (SMOCI) Near Unimak Pass, Alaska.

97163 N
No presentations outside EVOS (2 APEX meetings) are planned at present.

97163 O
Because of the support role of this project, no presentations are planned at present.

97163 P
No presentations are planned at present.

NORMAL AGENCY MANAGEMENT

97163 A
Not applicable

97163 B
see explanation under 97163 E

97163 C
NOAA and NMFS has statutory stewardship for all living marine resources; however, if the oil spill had not occurred NOAA would not be conducting this project. NOAA NMFS proposes to make a significant contribution (as stated in the proposed budget) to the operation of this project, making it truly cooperative.

97163 D
Not applicable

97163 E
The Fish and Wildlife Service is responsible for managing migratory birds. To manage bird populations indices of populations and production of several game bird species and a few non-game bird species are monitored in some parts of Alaska. In Prince William Sound the FWS funded a marine bird survey in 1972 and some seabird colony studies at Hinchinbrook Island in 1976 to 1978 in response to the building of the Alaska pipeline. In 1984-85 the FWS funded their first shoreline sea otter survey, combined with shoreline marine bird survey. Also in 1984 the FWS began annual monitoring black-legged kittiwake populations and productivity in PWS. The only ongoing monitoring of migratory birds in PWS is the kittiwake monitoring. The FWS generally does not fund research studies and when they do the studies are often on game species. The APEX study is only being conducted because there was an oil spill. The need for the APEX study would not exist if the oil spill had not occurred. The FWS is has contributed the past data on migratory birds to the EVOS trustees and is continuing to contribute the data collected on kittiwakes to the EVOS trustees.

97163 F
see explanation under 97163 E

97163 G
Not applicable

97163 H
Not applicable

97163 I
Not applicable

97163 J
The work that will be conducted on seabirds at the Barren Islands by AMNWR for the EVOS APEX project is not something that AMNWR or the FWS is required to do by statute or regulation. Until recently, the Barren Islands were listed as an intermittent monitoring site for tufted puffins and fork-tailed storm-petrels *(Oceanodroma furcata)* in the refuge's seabird monitoring program. In 1994, these islands were also designated as an annual monitoring site for murres and kittiwakes, primarily because EVOS-sponsored restoration studies demonstrated that data could be collected at them that satisfied standard refuge monitoring protocols for these species. Designating the Barren Islands as a annual monitoring site has improved the refuge's chances of obtaining funding for conducting murre and kittiwake studies at them. However, because these islands are not part of the FWS's highest priority ecosystem, the Bering Sea, monetary support for this kind of annual work will not be available until overall FWS priorities change (i.e., from the Bering Sea to other officially designated ecosystems within Alaska). Furthermore, many types of data that will be collected on murres, kittiwakes, puffins, gulls, and cormorants during the Barren Islands component of the APEX project are not obtained during normal AMNWR monitoring studies (e.g., feeding and growth rates of chicks, time-budgets of adults, types and amounts of prey fed to chicks). The proposed project is needed to obtain these and other types of data for a multiyear, multispecies, multicolony analysis of seabird productivity and energetics that will improve understanding of ecological processes and help explain why some species of seabirds are not recovering in the spill area. Results of APEX ecological processes investigations will markedly improve overall management of common murres and other seabird species in the Gulf of Alaska.

97163 K

Not applicable

97163 L
The National Biological Service conducts research in support of the land management missions of state and federal agencies. Internal programs and funds do not exist for routine monitoring or research on ecosystems. This project would not exist if the oil spill had not occurred.

97163 M
The National Biological Service conducts research in support of the land management missions of state and federal agencies. Internal programs and funds do not exist for routine monitoring or research on ecosystems. This project would not exist if the oil spill had not occurred.

97163 N
The National Biological Service conducts research in support of the land management missions of state and federal agencies. Internal programs and funds do not exist for routine monitoring or research on ecosystems. This project would not exist if the oil spill had not occurred.

97163 O
Not applicable

97163 P
Not applicable

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

APEX is in itself a major integrated research effort, spanning 16 principal investigators at 12 institutions, agencies, and private businesses. Details of integration at the individual project level may be found in the appendices for each project.

At the level of coordination between APEX and the other two Trustee-funded ecosystem projects, there are several efforts underway. SEA (Sound Ecology Assessment), NVP (Nearshore Vertebrate Project) and APEX are coordinating acoustic and inshore sampling methodologies. SEA and APEX share analysis capabilities for fish stomachs (97163 C). APEX, NVP and marine mammals programs will share the costs of proximate analysis (97163 H). NVP and APEX will be splitting field work and sharing data from the Jackpot and Naked island pigeon guillemot studies. NVP and APEX will also share the costs of guillemot field work in Kachemak Bay. On-going efforts by Project 97163 O with SEA and NVP will develop guidelines for use of Geographic Information Systems. Consultations between the project leaders of the three projects continue on a regular basis.

In coordination with Dr. Kathy Frost of ADF&G, 97163 I is collating harbor seal foraging data with historical data on distribution and changes in forage fish in Prince William Sound and the northern Gulf of Alaska. This effort will help us build up a "trophic landscape" of PWS, to ask "what are the spatial patterns of prey consumption by upper-level predators?", and to determine whether such predators co-vary in abundance.

We have also coordinated the development of the new Marbled Murrelet project (97231) so that it integrates its data collection and analysis with 97163 A, B. This project may itself be integrated into APEX.

Finally, we are in the process of discussing with the Mineral Management Service possible co-

sponsoring of 97163 L.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

97163 A

No major changes are planned until the results of the 1996 field season have been analyzed. Success in sampling inshore fish in 1996 will determine the future direction of research efforts.

97163 B

It is a major objective of this component to investigate the hypothesis that forage fish characteristics limit availability of seabird prey. To determine if forage availability is limiting seabird recovery it essential to gain an understanding of those mechanisms that enhance or inhibit access to food. During 1997, 96163 B will investigate the physical characteristics of foraging sites repeatedly used by black-legged kittiwakes and marbled murrelets; that is, sites associated with type 3 foraging flocks as defined by Hoffman *et al.* (1981). To some extent a similar question will be addressed by the Forage Fish project; however, based on discussions with K. Coyle, that project will be looking into reasons that forage fish are strongly associated with nearshore habitats. They will be attempting to determine if there is a small scale coastal frontal system. I am proposing to investigate a separate phenomenon, small scale downwelling associated with type 3 flocks. Such sites are probably tidally influenced, therefore sampling will need to extend over broad temporal scales to reveal the influence of both spring and neap cycles. K. Kuletz has observed that in some areas in Prince William Sound, marbled murrelets forage in single species flocks. She has speculated that at these locations, there is a deep water sill and that foraging murrelets do not drive prey to the surface. I will look at several sites in a natural experiment to make inferences beyond the specific study sites. I propose to compare type 3 sites of mixed foraging flocks, exclusive murrelet groups, and randomly selected control sites.

It will not be possible to examine type 3 sites during the forage fish cruise (96163 A) because the time required to collect data at an adequate number of sites would exceed the length of the currently proposed forage fish cruise. L. Haldorson gave me a rough estimate of an additional cost of $160 to $ 200 k to add 20 days to the 1997 cruise.

Additional data collection can be accomplished with 30 extra field days for a modest increase in my budget. To keep cost low, I will use a U.S. Fish and Wildlife Service Boston Whaler and will house my crew in established field camps. The work will require the purchasing of addition equipment which has been incorporated into the budget. The cost for data collection on mechanisms is $ 41.4 k with $ 25 k of that directed to the purchase or lease of hydroacoustic equipment. Five k has been added for emergency repair of equipment and $ 12 k for GIS and hydroacoustic data analysis.

97163 C

The future of this project depends on development of testable approaches to the question of how and to what extent forage fish interact. Further developments depend on the success of inshore sampling efforts in 1996.

97163 D

Not applicable

97163 E

No major changes are planned until the results of the 1996 field season have been analyzed.

97163 F
No major changes are planned until the results of the 1996 field season have been analyzed.

97163 G
No major changes are planned until the results of the 1996 field season have been analyzed.

97163 H
This is the first year of the project.

97163 I
The main change is a shift of resources toward a seed project in modeling of seabird/forage fish interactions, using money previously allocated to the November Forage Fish meeting and the assistant project leader.

The Project Leader will work closely with the P.I.'s to identify models that can be used to increase our understanding of the data gathered. Models will be needed that function at a variety of scales from foraging at schools of fish (Duffy 1986; Erikstad *et al.* 1990; Piatt 1990), through relationships between food availability and reproductive performance (Anderson *et al.* 1982; Cairns 1990; Williams and Croxall 1990) to community-level models that examine food consumption (Birkhead and Furness 1984; Cairns 1989), or population dynamics at colonies (Coulson and Thomas 1985), between colonies (Danchin and Monnat 1992; Buckley and Downer 1994), or at the population level (Simon 1984; Migot 1992).

We will continue testing models at the nest/colony level applied to seabirds by Cairns (1987), based on functional response models of Holling (1965) and to source-sink models (Pulliam 1988) and metapopulation models (Gilpin and Hanski 1991). One productive line of attack may be to consider colonies at the outsides of estuaries as 'sources', producing seabirds that emigrate to other colonies, farther in the estuaries (PWS, Cook Inlet), that produce few young, serving as 'sinks'. Under this model, reproduction at many colonies might be irrelevant, with the regional population sustained only by a few colonies such as the Barrens at the mouth of Cook Inlet or Porpoise Rocks at the mouth of PWS or Shoup Bay in Valdez Arm. Any such regional patterns could then be tied to spatial models of primary productivity. For example, if the flow of water is primarily north past the entrance to Montague Passage, few nutrients would be available for the immediate marine ecosystem, compared to the Barrens, where tides flow both north and south, bringing nutrients from the upper estuary.

Beyond this, in collaboration with the Fish and Wildlife Service this project is exploring the utility of a series of trophic models of colony size and distribution (Birkhead and Furness 1984; Cairns 1989), using GIS technology.

With David Schneider of Memorial University of Newfoundland and with Project 97163 O, we will explore a modeling effort to integrate research results to the benefit of long-term management. The usefulness of models in this context will depend on the quality and realism of constraints. We propose that realistic constraints will be introduced sequentially.

1. The first step will be computation of an energy budget for marine birds and their prey, based on constraints on transfer efficiency. This is expected to be straight-forward with the data at hand. This trophically-constrained model will help determine whether independent estimates of strength of trophic interaction are consistent.

2. Unfortunately, trophic transfer models are of limited use in evaluating the impact of perturbations on age-structured populations such as seabirds, so the next constraint to be

introduced will be a population renewal rate, based on demography.

3. Models constrained by demographics are of limited utility in evaluating the range of possible outcomes for point source pollutants. A realistic geographic model is needed to incorporate variation in movement and impact of point-source pollution. We plan to explore the use of circulation models together with foraging models, to introduce realistic geographical constraints.

We also plan top explore the possibility of working with a professional software company to produce a geographically-structured model in FY 99. The goal will be to incorporate what has been learned about the spatial dynamics of Prince William Sound, and about the impacts of point-source pollutants, in a complex geographic setting. A related goal is to convey to the public what has been learned from EVOS research in an appealing and readily grasped visual format of an interactive computer program, with professional quality graphics.

97163 J
The overall project design, including methods and schedules presented in the FY 96 DPD for the Barren Islands APEX study component are not likely to change significantly during the FY 97 portion of the project. However, some methods of data collection and analyses may be refined in consultation with other the APEX Project Leader (D. Duffy) and other APEX principal investigators (e.g., D. Irons, J. Piatt, D. Roby); refinements based on new information obtained during annual field work and data analyses are an on-going process). Any potential changes in objectives or methods that may be identified during the life of the project will be discussed with the APEX Project Leader (D. Duffy) and other APEX principal investigators, and if changes become necessary, they will cleared with the Chief Scientist and the EVOS science coordinator via the APEX Project Leader.

97163 K
Continuing inactive status.

97163 L

97163 M
No major changes are planned until the results of the 1996 field season have been analyzed.

97163 N
An increase in budget will be needed to pay for research and living space formerly provided by 96163 M with Mineral Management Service monies. A new freezer will similarly be required to replace one formerly supplied by 97163 M. Finally, the Graduate assistant's support is extended from nine to twelve months to assist with data analysis.

97163 O
No major changes are planned until the results of the 1996 field season have been analyzed.

97163 P
Continuation of this project will depend on the results from FY 96. A decision to continue will be made after analysis of specimens, based on the 1 September 96 report.

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97163 D
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97163 E
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PERSONNEL

Fifty-seven persons are involved in APEX. These include 16 Principal Investigators. Their qualifications may be found in the individual detailed project descriptions for 96163 A-P.

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1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	PROPOSED FFY 1997 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
			$0.0	$31.9	$0.0	$0.0	$1,238.6	$1,019.1
Personnel	$611.3	$751.3						
Travel	$33.9	$94.6						
Contractual	$939.2	$1,027.8						
Commodities	$47.7	$102.2						
Equipment	$30.9	$135.6	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$1,663.0	$2,111.5	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$137.7	$178.1						
Project Total	$1,800.7	$2,289.6	$2,213.6	$2,150.4	$176.4	$0.0	$0.0	$0.0
Full-time Equivalents (FTE)	17.0	20.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Comments: The primary objective of the 1994 Forage Fish Study was to test techniques and collect data in PWS to aid in designing sampling methods for subsequent years. In 1995 the Apex Predator Ecosystem Experiment (APEX) conducted simultaneous seabird and hydroacoustic surveys in conjunction with collections of seabird productivity and energetics data. The 1996 APEX project will include related monitoring and research of seabirds and their forage fish prey. Additional components of APEX will continue analysis of historic Gulf of Alaska trawl data, ecosystem modeling, and investigating continued exposure of sand lance to Exxon Valdez oil. The 1997 APEX study may incorporate marbled murrelet investigations.

163D, Puffins as Samplers, is being dropped from APEX for the FY97 funding request.

1997

Project Number: 97163A-P
Project Title: APEX
Lead Agency:

FORM 2A
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$14.0	$0.0						
Travel	$0.0	$3.4						
Contractual	$380.0	$383.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$394.0	$386.4	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$27.5	$20.2						
Project Total	$421.5	$406.6	$420.0	$420.0				
Full-time Equivalents (FTE)	0.2	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This project was first funded as a component of the Forage Fish Ecosystem Study (94163) then as the APEX project (95163A and 96163A).

1997

Project Number: 97163A
Project Title: APEX/Forage Fish Assessment
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
Name	Position 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
	Subtotal		0.0	0	0	
					Personnel Total	$0.0

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
Description					
Juneau to Anchorage (APEX planning and review meetings)	444	3	9	225	3.4
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$3.4

1997

Project Number: 97163A
Project Title: APEX/Forage Fish Assessment
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
printing of APEX annaul report, DPD, and detailed budgets (38 copies each)	3.0
Forage Fish Assessment Contract	380.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$383.0

Commodities Costs:	Proposed
Description	FFY 1997
Commodities Total	$0.0

1997

Project Number: 97163A
Project Title: APEX/Forage Fish Assessment
Agency: NOAA

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163A
Project Title: APEX/Forage Fish Assessment
Agency: NOAA

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$92.8	$92.8						
Travel	$15.5	$15.5						
Contractual	$158.8	$158.8						
Commodities	$4.4	$4.4						
Equipment	$6.9	$6.9						
Subtotal	$278.4	$278.4						
Indirect (42.2%)	$101.6	$101.6						
Project Total	$380.0	$380.0	$400.0	$400.0				
Full-time Equivalents (FTE)	2.8	2.8						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This project was first funded as a component of the Forage Fish Ecosystem Study (94163) then as the APEX project (95163A and 96163A). The primary objective of this project is to collect hydroacoustic and net sampling data and to analyze these data. Indirect costs are 42.2% of total except equipment and student tuition.

1997

Project Number: 97163A
Project Title: APEX/Forage Fish Assessment
Name: University of Alaska Fairbanks

FORM 4A
Non-Trustee
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			Months	Monthly		Proposed
	Name	Position Description	Budgeted	Costs	Overtime	FFY 1997
	L. Haldorson	PI	1.6	8,555	0	13.7
	T. Shirley	fish biologist	1.4	7,328	0	10.3
	K. Coyle	fish biologist	4.0	5,250	0	21.0
		technician	3.0	3,455	0	10.4
		M.S. student	9.0	1,096	0	9.9
		M.S. student	3.0	1,096	0	3.3
		M.S. student	9.0	1,096	0	9.9
		M.S. student	3.0	1,096	0	3.3
		tuition (4 semesters @ $2770/semester)				11.0
						0.0
						0.0
						0.0
		Subtotal	34.0	28,972	0	
					Personnel Total	$92.8

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
	Fairbanks to Cordova	454	2	6	103	1.5
	Juneau to Cordova	352	4	8	103	2.2
	Juneau to Seattle	752	2	8	113	2.4
	Fairbanks to Seattle	1,248	2	6	113	3.2
	Juneau to Anchorage	444	4	12	170	3.8
	Fairbanks to Anchorage	218	3	10	170	2.4
		0	0	0	0	0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$15.5

1997

Project Number: 97164A
Project Title: APEX/Forage Fish Assessment
Name: University of Alaska Fairbanks

FORM 4B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
communications	0.5
vessel charters: nearshore acoustic vessel @ 1,200/day	14.4
nearshore seine vessel @ 1,050/day	12.6
oceanographic vessel @ 1,250/day	15.0
offshore acoustic vessel @1,400/day	16.8
offshore mid-water trawl @ 2,500/day	37.5
Biosonics hydroacoustics	61.5
shipping	0.5
Contractual Total	$158.8

Commodities Costs:	Proposed
Description	FFY 1997
calorimeter supplies	0.2
chemicals (formalin STF substitute, formalin, and gasses)	0.8
office supplies	0.2
sample bottles and jars	1.5
computer supplies	1.2
shipping containers (20 @ $22.50 ea.)	0.5
Commodities Total	$4.4

1997

Project Number: 97163A
Project Title: APEX/Forage Fish Assessment
Name: University of Alaska Fairbanks

FORM 4B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1997
gillnets (2 @ $250 ea.)	2	250	0.5
Kodiak trawl	1	1,500	1.5
small beach seine (2 @ $400 ea.)	2	400	0.8
large beach seine (2 @ $800 ea.)	2	800	1.6
mid-water trawl	1	2,500	2.5
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$6.9

Existing Equipment Usage:	Number	
Description	of Units	

1997

Project Number: 97163A
Project Title: APEX/Forage Fish Assessment
Name: University of Alaska Fairbanks

FORM 4B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
Personnel	$101.4	$97.4						
Travel	$8.2	$9.2						
Contractual	$4.7	$10.2						
Commodities	$0.7	$8.1						
Equipment	$1.7	$36.5						
Subtotal	$116.7	$161.4	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$15.5	$15.3						
Project Total	$132.2	$176.7	$177.0	$177.0				
Full-time Equivalents (FTE)	2.2	2.1						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: Collect seabird activity data while simultaneously monitoring fish abundance to determine seabirds' relationship to forage resources, how seabird's foraging behavior responds to change in the forage resource, and if forage availability is limiting population recovery. By collecting long tern data on seabird activity while simultaneously monitoring forage fish abundance and distribution this project will determine relationship to forage resources, how seabirds' foraging behavior responds to change in the forage resource, and if forage availability is limiting population recovery.

1997

Project Number: 97163B
Project Title: APEX/Seabird Interactions
Agency: DOI

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/	Months	Monthly		Proposed
	Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1997
	B. Ostrand	PI	GS11-3	12.0	4,892		58.7
		Biologist	GS9	3.0	3,900		11.7
		Research Assistant (grad. student)		5.0	3,000		15.0
		Biotech.	GS5	5.0	2,400		12.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		25.0	14,192	0	
						Personnel Total	$97.4

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
	Anchorage to Whittier (& field work in PWS)	100	18	300	3	2.7
	Anchorage/Cordova to Valdez	200	6	10	225	3.5
	emergency travel					1.0
	Restoration Workshop and other meetings					2.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$9.2

1997

Project Number: 97163B
Project Title: APEX/Seabird Interactions
Agency: DOI

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
safety training for 3 people @ $830/person	2.5
boat maintenance and repair (Whaler and other solid hull boats)	2.5
telephone services in field and office	0.7
computer, printer, network repair and maintenance	0.5
film processing	0.2
postage and freight	0.4
publication page charges	0.5
maintenance and cleaning of camping equipment for 3 people @ $100/person	0.3
maintenance and cleaning of binoculars and spotting scopes	0.5
maintenance and cleaning of cameras	0.1
emergency repair of equipment	2.0
When a non-trustee organization is used, the form 4A is required. Contractual Total	$10.2

Commodities Costs:	Proposed
Description	FFY 1997
food: 3 people, 30 days @ $12/day	1.1
boat fuel: 100 gallons/day for 30 days @$1.50/gallon	4.5
camp supplies (stove and lateen fuel, mantles, head nets, bud spray, batteries, cleaning materials)	0.4
scientific supplies (batteries for radios and other equipment, film, waterproof notebooks, sample bags, scales, calipers, and rul	0.5
rain gear, rubber boots and gloves for 3 people @$200/person	0.6
lines, anchors, and propellers for boats	0.5
software updates for computers	0.4
first aid kits	0.1
Commodities Total	$8.1

1997

Project Number: 97163B
Project Title: APEX/Seabird Interactions
Agency: DOI

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
emergency replacement of equipment			2.3
camp equipment (stoves, lanterns, tents, tools, batteries, dishes)			1.2
Seacat C-T recorder			5.0
military GPS (for high degree of accuracy)			3.0
Biosonics DT-4000 (buy or lease)			25.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$36.5

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163B
Project Title: APEX/Seabird Interactions
Agency: DOI

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$59.8	$86.8						
Travel	$5.1	$8.6						
Contractual	$0.0	$0.0						
Commodities	$3.0	$4.0						
Equipment	$0.0	$0.0						
Subtotal	$67.9	$99.4						
General Administration	$9.0	$13.0						
Project Total	$76.9	$112.4	$38.0	$38.0				
Full-time Equivalents (FTE)	1.3	1.8						
Dollar amounts are shown in thousands of dollars.								
Other Resources								

Comments: This project is designed to understand diet overlap of forage fish species in Prince William Sound.

1997

Project Number: 97163C
Project Title: APEX/Fish Diet Overlap
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/	Months	Monthly		Proposed
	Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1997
	M. Sturdevant	PI	GS11/3	4.0	5,500		22.0
		fisheries technician	GS 5/7	6.0	3,600		21.6
		fisheries technician	GS 5/7	6.0	3,600		21.6
		fisheries technician	GS 5/7	6.0	3,600		21.6
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		22.0	16,300	0	
						Personnel Total	$86.8

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
	Juneau to Cordova	400	4	16	225	5.2
	Juneau to Anchorage	444	3	9	225	3.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$8.6

1997

Project Number: 97163C
Project Title: APEX/Fish Diet Overlap
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed
Description	FFY 1997
sample bottles, formalin, and microscope work supplies	3.0
plankton nets (2)	1.0
Commodities Total	$4.0

1997

Project Number: 97163C
Project Title: APEX/Fish Diet Overlap
Agency: NOAA

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency
binocular dissecting microscope (Trustee Council equipment)	1	
computer (NOAA)	3	
electronic balances (NOAA)	3	
microscopes (NOAA)	3	

1997

Project Number: 97163C
Project Title: APEX/Fish Diet Overlap
Agency: NOAA

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$93.5	$96.6						
Travel	$7.7	$8.7						
Contractual	$17.1	$19.1						
Commodities	$22.0	$22.0						
Equipment	$8.9	$11.7						
Subtotal	$149.2	$158.1						
General Administration	$15.2	$15.8						
Project Total	$164.4	$173.9	$175.0	$175.0				
Full-time Equivalents (FTE)	2.1	2.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This component will collect information on kittiwake foraging and reproductive parameters that indicate food stress.

1997

Project Number: 97163 E
Project Title: APEX/Kittiwakes
Agency: DOI

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/	Months	Monthly		Proposed
	Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1997
	R. Suryan	co-PI	GS11	12.0	4,575		54.9
	D. Irons	co-PI	GS12	1.0	6,000		6.0
		biologist	GS9	3.0	3,900		11.7
		biotech.	GS5	5.0	2,400		12.0
		biotech.	GS5	5.0	2,400		12.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		26.0	19,275	0	
						Personnel Total	$96.6

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
	Anchorage to Whittier: transport boat, 2 trips @ $1,200/round trip plus	1200	2	360	3	3.5
	Anchorage to Whittier	100	12			1.2
	float plane trips to study site	250	4			1.0
	emergency travel (injuries, equipment repair and replacement)					1.0
	travel to scientific meetings to present study results					2.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$8.7

1997

Project Number: 97163E
Project Title: APEX/Kittiwakes
Agency: DOI

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
delivery of equipment and supplies to study site (split with 97163 F)	2.0
delivery of fuel to study site (split with 97163 F)	2.0
safety training for 3 people @ $830/person	2.5
boat maintenance and repair (Whalers and solid-hull boats)	5.0
telephone services in offices and in field	0.7
computer, printer, and network repair and maintenance	0.5
film processing, postage and freight	0.6
publication page charges	0.5
maintenance and cleaning of camping equipment for 3 people @ $200/person	0.6
maintenance and cleaning of 2 inflatable boats ($400/boat) and 2 motors ($400/motor)	1.6
maintenance and cleaning of binoculars, spotting scope, and camera	0.6
maintenance and cleaning of radio telemetry equipment	0.5
emergency repair of equipment	2.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$19.1

Commodities Costs:	Proposed
Description	FFY 1997
food for 3 people for 120 days @ $12/day	4.3
boat fuel: 150 gal/day for 60 days @ $1.50/gal.	13.5
camp supplies (stove and lantern fuel, mantles, head nets, bug spray, batteries, and cleaning materials)	0.4
scientific supplies (batteries for radios, film, waterproof notebooks, sample bags, scales, calipers, rulers)	1.2
rain gear, rubber boots, and gloves for 3 people @ $200/person	0.6
lines, anchors, and propellers for boats	1.5
software updates for computers	0.4
first aid kits	0.1
Commodities Total	$22.0

1997

Project Number: 97163E
Project Title: APEX/Kittiwakes
Agency: DOI

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1997
radio tags			8.5
camp equipment (stoves, lanterns, tents, tools, batteries, dishes)			1.2
emergency replacement of equipment			2.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.	New Equipment Total		$11.7

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

1997

Project Number: 97163E
Project Title: APEX/Kittiwakes
Agency: DOI

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$97.2	$95.9						
Travel	$6.6	$7.6						
Contractual	$12.6	$14.6						
Commodities	$12.1	$12.1						
Equipment	$4.3	$3.3	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$132.8	$133.5	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$15.5	$15.4						
Project Total	$148.3	$148.9	$150.0	$150.0				
Full-time Equivalents (FTE)	2.1	2.1						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This study will monitor the feeding and breeding ecology of pigeon guillemots on Naked Island in Prince William Sound and census their population there and at other designated study areas.

1997

Project Number: 97163F
Project Title: APEX/Guillemots
Agency: DOI

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	Name	Position Description					
	L. Hayes	PI	GS11	12.0	4,808		57.7
		biologist	GS9	3.0	3,900		11.7
		biotech.	GS7	5.0	2,900		14.5
		biotech.	GS5	5.0	2,400		12.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		25.0	14,008	0	
						Personnel Total	$95.9

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	Description					
	Anchorage to Whittier to transport boat	1200	2			2.4
	Anchorage to Whittier for 4 people	100	16			1.6
	field per diem: 2 people, 100 days @ $3/day					0.6
	travel to scientific meeting					2.0
	emergency travel					1.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$7.6

1997

Project Number: 97163F
Project Title: APEX/Guillemots
Agency: DOI

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
delivery of equipment and supplies to study site (spilt w/96163E)	2.0
delivery of fuel to study site (spilt w/96163E)	2.0
safety training for 2 people @ $830/person	1.7
boat maintenance and repair (Whaler or other solid-hull boat)	3.0
telephone services in office and in field	0.5
computer, printer, network repair and maintenance	0.5
film processing, postage and freight	0.4
publication page charges	0.2
maintenance and repair of 3 inflatable boats ($400/boat) and 2 motors ($400/motor)	1.6
maintenance and repair of binoculars, spotting scope, and cameras	0.3
maintenance and repair of camping equipment for 2 people @ $200/person	0.4
emergency repair of equipment	2.0
When a non-trustee organization is used, the form 4A is required. Contractual Total	$14.6

Commodities Costs:	Proposed
Description	FFY 1997
food for 4 people for 100 days @ $12/day	4.8
boat fuel: 100g/day for 30 days @ $1.50/gal.	4.5
camp supplies (stove/lantern fuel, bug spray, batteries, tarps)	0.5
lumber, canvas, and hardware for tent floors and observation blinds	0.4
scientific supplies (batteries for radios, waterproof notebooks, sample bags, dial calipers, rulers)	0.5
rain gear, gloves and boots for 2 people @ $200/person	0.4
lines, anchors, propellers for boats	0.5
software updates for computers	0.4
first aid kits	0.1
Commodities Total	$12.1

1997

Project Number: 97163F
Project Title: APEX/Guillemots
Agency: DOI

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
tools for boat and camp			0.3
materials for nest boxes			1.0
emergency replacement of equipment			2.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$3.3

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163F
Project Title: APEX/Guillemots
Agency: DOI

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$3.5	$0.0						
Travel	$0.0	$0.0						
Contractual	$160.0	$167.9						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$163.5	$167.9						
General Administration	$11.5	$11.8						
Project Total	$175.0	$179.7	$182.0	$182.0				
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: Assess the taxonomic and biochemical composition of seabird diets and determine the relationship of diet to nestling provisioning rates, chick growth energetics, and the reproductive success of seabirds in the EVOS area.

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		0.0	0	0	
						Personnel Total	$0.0

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
						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

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed FFY 1997
Description	
Contract with the University of Alaska Cooperative Research Unit.	167.9
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$167.9

Commodities Costs:	Proposed FFY 1997
Description	
Commodities Total	$0.0

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Agency: NOAA

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Agency: NOAA

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
Personnel	$42.2	$50.0						
Travel	$9.1	$9.9						
Contractual	$23.6	$27.5						
Commodities	$43.5	$41.3						
Equipment	$11.7	$7.2						
Subtotal	$130.1	$135.9	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Indirect (26%)	$29.9	$32.1						
Project Total	$160.0	$168.0	$170.0	$170.0				
Full-time Equivalents (FTE)	2.0	2.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: Assess the taxonomic and biochemical composition of seabird diets and determine the relationship of diet to nestling provisioning rates, chick growth energetics, and the reproductive success of seabirds in the EVOS area.

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Name: Oregon State University

FORM 4A
Non-Trustee
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FFY 1997
	graduate student, Ph.D.		9.0	1,701		15.3
	research assistant (Jackpot Is.)		3.0	1,923		5.8
	research assistant (Naked Is.)		3.0	1,923		5.8
	research assistant (Eleanor Is.)		3.0	1,923		5.8
	research assistant (Kachemak Bay)		3.0	1,923		5.8
	research assistant (laboratory)		3.0	2,079		6.2
	student tuition					5.3
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		24.0	11,472	0	
					Personnel Total	$50.0

Travel Costs:		Ticket	Round	Total	Daily	Proposed
Description		Price	Trips	Days	Per Diem	FFY 1997
	presentation at national meetings	1,000	2			2.0
	Anchorage to Cordova to field station	735	8	14	130	7.7
	train Portage to Whittier for 2 vehicles	70	2			0.1
	train Portage to Whittier	16	8			0.1
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$9.9

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Name: Oregon State University

FORM 4B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
boat charter	5.3
personal services contract to FALCO for fish ID and processing	7.4
duplication/computer fees	1.5
publication: page charges, reports, visual aids	2.4
weatherport maintenance	0.5
vehicle rental ($40/day, $.50/mile @ 1,100 miles X 2 vehicles + rental Anch. to Whittier)	2.8
maintenance of field equipment	1.0
maintenance of Zodiac	0.9
maintenance of laboratory equipment	3.0
field radio equipment rental: SSB	1.0
maintenance of 25 hp boat motor	0.8
maintenance of propane freezer and accessories	0.6
long distance telephone services	0.3
Contractual Total	$27.5

Commodities Costs:	Proposed
Description	FFY 1997
drying oven	2.0
propane freezers (2), propane fuel tanks, and hoses	3.8
lab. supplies, chemicals, extraction thimbles, and sample bags	5.8
Pesols spring scales (5 @ $40 each)	0.2
binoculars (10X40, Steiner low light, 1 each)	0.5
camp & field supplies (food, sleeping bags, pads & cots, propane heaters, MSR Waterwork filtration system, rite-in rain supplie	18.5
boat fuel (50 gallons/day @ 2.10/gallon for 87 days)	9.1
tent (VE25 Northface)	0.9
climbing equipment (helmets, ropes, harnesses, webbing, carabiners, jumars)	0.5
Commodities Total	$41.3

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Name: Oregon State University

FORM 4B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1997
Soxhlet apparatus, 6 place	1	1,483	1.5
muffle furnace	1	5,747	5.7
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$7.2

Existing Equipment Usage:	Number
Description	of Units

1997

Project Number: 97163G
Project Title: APEX/Seabird Energetics
Name: Oregon State University

FORM 4B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$0.0	$0.0						
Travel	$0.0	$0.0						
Contractual	$0.0	$80.9						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$0.0	$80.9						
General Administration	$0.0	$5.7						
Project Total	$0.0	$86.6	$75.0	$75.0				
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This project of the APEX investigation will determine the proximate composition and energetic content of selected forage fish species in the EVOS study area. The intent is for this project to be managed within the APEX framework but to draw funding from several different sources. This is a proposal submitted under the Broad Agency Announcement. This project was not funded in FY95 or FY96.

1997

Project Number: 97163H
Project Title: APEX/Proximate Composition of Forage Fish
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		0.0	0	0	
						Personnel Total	$0.0

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$0.0

1997

Project Number: 97163H
Project Title: Proximate Composition of Forage Fish
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed
Description	FFY 1997
Commodities Total	$0.0

1997

Project Number: 97163H
Project Title: APEX/Proximate Composition of Forage Fish
Agency: NOAA

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163H
Project Title: APEX/Proximate Composition of Forage Fish
Agency: NOAA

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$0.0	$34.0						
Travel	$0.0	$4.9						
Contractual	$0.0	$0.0						
Commodities	$0.0	$20.0						
Equipment	$0.0	$0.0						
Subtotal	$0.0	$58.9						
Indirect (45%)	$0.0	$21.9						
Project Total	$0.0	$80.8	$70.0	$70.0				
Full-time Equivalents (FTE)	0.0	1.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This project of the APEX investigation will determine the proximate composition and energetic content of selected forage fish species in the EVOS study area. This is a proposal issued submitted under the Broad Agency Announcement. This project/contract not funded in FY95 or FY96. The intent of this project is to be managed within the APEX framework but to draw funding from several different sources.

1997

Project Number: 97163H
Project Title: APEX/Proximate Composition of Forage Fish
Name: Texas A&M University

FORM 4A
Non-Trustee
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FFY 1997
G. Worthy	PI		2.0	6,500	0	13.0
T. Miculka	research technician		10.0	2,100		21.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		1.0	8,600	0	
					Personnel Total	$34.0

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 1997
Houston, TX to PWS for sampling	800	2	20	100	3.6
Houston, TX to Anchorage for Restoration meeting	800	1	5	100	1.3
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$4.9

1997

Project Number: 97163H
Project Title: APEX/Proximate Composition of Forage Fish
Name: Texas A&M University

FORM 4B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
Contractual Total	$0.0

Commodities Costs:	Proposed
Description	FFY 1997
solvents and expendibles	5.0
phone and mail	5.0
shipping	5.0
storage cases	5.0
Commodities Total	$20.0

1997

Project Number: 97163H
Project Title: APEX/Proximate Composition of Forage Fish
Name: Texas A&M University

FORM 4B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number of Units	Unit Price	Proposed FFY 1997
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
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage:	Number of Units	
Description		

1997

Project Number: 97163H
Project Title: APEX/Proximate Composition of Forage Fish
Name: Texas A&M University

FORM 4B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$11.0	$0.0						
Travel	$0.9	$0.0						
Contractual	$165.0	$154.4						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$176.9	$154.4						
General Administration	$9.2	$10.8						
Project Total	$186.1	$165.2	$170.0	$155.0	$155.0			
Full-time Equivalents (FTE)	1.7	1.7						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This component of the APEX project will provide scientific oversight, coordination, performance tracking, and integration of results. The project management will have elements that have been used effectively in other large, multidisciplinary programs for ecosystem assessment. This is a proposal submitted under the Broad Agency Announcement.

1997

Project Number: 97163I
Project Title: APEX/Project Management
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	Name	Position Description					
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		0.0	0	0	
						Personnel Total	$0.0

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	Description					
						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

1997

Project Number: 97163I
Project Title: APEX/Project Management
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
contract to University of Alaska Anchorage (BAA)	154.4
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$154.4

Commodities Costs:	Proposed
Description	FFY 1997
Commodities Total	$0.0

1997

Project Number: 97163I
Project Title: APEX/Project Management
Agency: NOAA

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163I
Project Title: APEX/Project Management
Agency: NOAA

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$92.1	$84.7						
Travel	$7.0	$7.0						
Contractual	$15.0	$20.0						
Commodities	$4.0	$4.0						
Equipment	$5.0	$5.0						
Subtotal	$123.1	$120.7						
Indirect (30.9%)	$31.9	$31.9						
Project Total	$155.0	$152.6	$155.0	$140.0	$140.0			
Full-time Equivalents (FTE)	1.6	1.3						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This component of the APEX project will provide scientific oversight, coordination, performance tracking, and integration of results. The program management employed will have elements that have been used effectively in other large, multidisciplinary programs for ecosystem assessment. This is a proposal submitted under the Broad Agency Announcement.

1997

Project Number: 97163I
Project Title: APEX/Project Management
Name: University of Alaska Anchorage

FORM 4A
Non-Trustee
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			Months	Monthly		Proposed
Name	Position Description		Budgeted	Costs	Overtime	FFY 1997
D. Duffy	PI		6.0	8,000		48.0
	data manager for GIS		5.5	5,746		31.6
	student assistant		4.0	1,274		5.1
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		15.5	15,020	0	
					Personnel Total	$84.7

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 1997
Anchorage to PWS communities to complete information transfer	350	4	12	225	5.0
Anchorage to Juneau	444	2	5	225	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$7.0

1997

Project Number: 97163I
Project Title: APEX/Project Management
Name: University of Alaska Anchorage

FORM 4B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
modeling contract ($13.0K for personnel & $7.0K for travel)	20.0
Contractual Total	$20.0

Commodities Costs:	Proposed
Description	FFY 1997
computer software and associated GIS supplies	4.0
Commodities Total	$4.0

1997

Project Number: 97163I
Project Title: APEX/Project Management
Name: University of Alaska Anchorage

FORM 4B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number of Units	Unit Price	Proposed FFY 1997
Description			
computer			5.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$5.0

Existing Equipment Usage:	Number of Units	
Description		

1997

Project Number: 97163I
Project Title: APEX/Project Management
Name: University of Alaska Anchorage

FORM 4B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$69.6	$79.1						
Travel	$2.9	$7.4						
Contractual	$11.0	$7.6						
Commodities	$8.3	$13.8						
Equipment	$4.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$95.8	$107.9	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$8.2	$12.4						
Project Total	$104.0	$120.3	$122.0	$122.0				
Full-time Equivalents (FTE)	1.8	1.9						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This component is designed to collect data on common murres, kittiwakes, and puffins on the Barren Islands (which is in the EVOS area) that will be used in a multi-species analysis of seabird productivity and energetics.

Personnel costs include costs of analyzing FY96 data and report writing, and costs for FY97 field work.

1997

Project Number: 97163J
Project Title: APEX/Barren Islands Seabird Studies
Agency: DOI

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	Name	Position Description					
	D. Roseneau	PI	GS11/5	9.0	4,400		39.6
	A. Kettle	camp leader/bio. tech.	GS7/1	9.0	3,000		27.0
	S. Zuniga	bio. tech..	GS5/1	5.0	2,500		12.5
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		23.0	9,900	0	
						Personnel Total	$79.1

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	Description					
	Homer to Anchorage	150	2	10	225	2.6
	per diem @ $3/day x 200 days					0.6
	2 vessel charter days @$2.1/day					4.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$7.4

1997

Project Number: 97163J
Project Title: APEX/Barren Islands Seabird Studies
Agency: DOI

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed FFY 1997
Description	
2 SCA volunteer in Homer, 3 months @ $3.8 each	7.6
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$7.6

Commodities Costs:	Proposed FFY 1997
Description	
gas, oil, Blazo, propane	3.1
field, climbing, and camping gear	0.7
replace climbing ropes, pitons, carabiners, chokes, webbing	1.0
boating supplies	0.5
camping supplies	0.4
replacement boots, rain gear and sleeping bags	1.0
food habits sample analysis (75 samples @ $18/each)	1.4
upgrade and purchase of computer software	0.8
posters at public meetings (4 posters @ $.2 each)	0.8
notebooks and film	0.3
cleaning, repair, and service of outboard motors, boats, radios, tents, binoculars, spotting scopes, time-lapse video cameras	3.8
Commodities Total	$13.8

1997

Project Number: 97163J
Project Title: APEX/Barren Islands Seabird Studies
Agency: DOI

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163J
Project Title: APEX/Barren Islands Seabird Studies
Agency: DOI

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$4.1	$8.8						
Travel	$0.0	$0.5						
Contractual	$0.0	$3.7						
Commodities	$0.0	$2.0						
Equipment	$0.0	$0.0						
Subtotal	$4.1	$15.0						
General Administration	$0.6	$1.6						
Project Total	$4.7	$16.6	$17.0	$17.0				
Full-time Equivalents (FTE)	0.1	0.2						
Dollar amounts are shown in thousands of dollars.								
Other Resources								

Comments: Forage fish will be obtained from the stomachs of sport caught large fish predators to test the feasibility and effectiveness of obtaining low cost, spatial and relative abundance data on forage fish in the Gulf of Alaska. Based on peer review and Chief Scientist recommendations, this project was discontinued for FY96.

Interim budget of $4.7K was to allow data analysis and presentation of results at APEX review meeting 11/30/95.

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/USFWS

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	Name	Position Description					
	D Roseneau	PI	2	2.0	4,400		8.8
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		2.0	4,400	0	
Those costs associated with program management should be indicated by placement of an *.						Personnel Total	$8.8

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	Description					
	Homer to Seward	275	1	1	225	0.5
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$0.5

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/USFWS

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed FFY 1997
Description	
1 SCA volunteer in Homer for 3 months	3.7
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$3.7

Commodities Costs:	Proposed FFY 1997
Description	
sampling supplies and freight	2.0
Commodities Total	$2.0

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/USFWS

FORM 3B Contractual & Commodities DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/USFWS

FORM 3B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$0.0	$3.7						
Travel	$0.0	$0.0						
Contractual	$0.0	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$0.0	$3.7	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$0.0	$0.6						
Project Total	$0.0	$4.3	$5.0	$5.0				
Full-time Equivalents (FTE)	0.0	0.3						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: Forage fish will be obtained from the stomachs of sport caught large fish predators to test the feasibility and effectiveness of obtaining low cost, spatial and relative abundance data on forage fish in the Gulf of Alaska. Based on peer review and Chief Scientist recommendations, this project was discontinued for FY96.

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/NPS

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	Name	Position Description					
		NPS volunteer		4.0	925		3.7
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		4.0	925	0	
						Personnel Total	$3.7

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	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
					Travel Total	$0.0

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/NPS

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed
Description	FFY 1997
Commodities Total	$0.0

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/NPS

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163K
Project Title: APEX/Large Fish as Samplers
Agency: DOI/NPS

FORM 3B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$19.0	$19.0						
Travel	$0.0	$0.0						
Contractual	$0.0	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$19.0	$19.0	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$1.0	$2.9						
Project Total	$20.0	$21.9	$22.0	$22.0				
Full-time Equivalents (FTE)	0.5	0.5						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This component will also coordinate the continuation of the historic review of the ecosystem structure in the Prince William Sound/Gulf of Alaska complex. Included in this review will be obtaining and synthesizing several forage fish data sets.

1997

Project Number: 97163L
Project Title: APEX Historic Review
Agency: DOI

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	J. Piatt	PI	13	0.9	6,400		5.8
		bio. tech.	5	4.5	2,933		13.2
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		5.4	9,333	0	
						Personnel Total	$19.0

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
						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

1997

Project Number: 97163L
Project Title: APEX Historic Review
Agency: DOI

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
	0.0
When a non-trustee organization is used, the form 4A is required. Contractual Total	$0.0

Commodities Costs:	Proposed
Description	FFY 1997
	.0.0
Commodities Total	$0.0

1997

Project Number: 97163L
Project Title: APEX Historic Review
Agency: DOI

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163L
Project Title: APEX Historic Review
Agency: DOI

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$8.4	$8.4						
Travel	$1.0	$1.0						
Contractual	$21.0	$21.0						
Commodities	$0.0	$0.0						
Equipment	$12.0	$12.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$42.4	$42.4	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$2.7	$2.7						
Project Total	$45.1	$45.1	$45.0	$45.0				
Full-time Equivalents (FTE)	0.3	0.3						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments: This component will continue the historic review of the ecosystem structure in the Prince William Sound/Gulf of Alaska complex. Included in this review will be obtaining and synthesizing several forage fish data sets.

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	P. Anderson	biologist	GS9	4.0	2,100		8.4
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		4.0	2,100	0	
						Personnel Total	$8.4

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	Kodiak to Anchorage	250	2	10	225	2.8
						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

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
GIS/Statician	21.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$21.0

Commodities Costs:	Proposed
Description	FFY 1997
Commodities Total	$0.0

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: NOAA

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
GIS equipment and software			12.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$12.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: NOAA

FORM 3B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$30.3	$27.7						
Travel	$0.0	$0.0						
Contractual	$0.0	$0.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$30.3	$27.7						
General Administration	$2.0	$4.2						
Project Total	$32.3	$31.9	$31.0	$31.0				
Full-time Equivalents (FTE)	0.6	0.6						
Dollar amounts are shown in thousands of dollars.								
Other Resources								

Comments: This component will continue the historic review of the ecosystem structure in the Prince William Sound/Gulf of Alaska complex. Included in this review will be obtaining and synthesizing several forage fish data sets.

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: ADF&G

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/	Months	Monthly		Proposed
	Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1997
		fisheries technician (Homer)	1	3.0	3,300		9.9
	J Blackburn	biologist III (Kodiak)	18	4.0	4,450		17.8
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		7.0	7,750	0	
						Personnel Total	$27.7

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
						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

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: ADF&G

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$0.0

Commodities Costs:	Proposed
Description	FFY 1997
Commodities Total	$0.0

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: ADF&G

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

1997

Project Number: 97163L
Project Title: APEX/Historic Review of Forage Fish Data
Agency: ADF&G

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$73.2	$206.2						
Travel	$0.0	$45.7						
Contractual	$126.8	$108.3						
Commodities	$0.0	$38.5						
Equipment	$0.0	$71.6	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$200.0	$470.3	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
General Administration	$14.0	$38.5						
Project Total	$214.0	$508.8	$515.0	$515.0				
Full-time Equivalents (FTE)	3.0	4.9						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

This study is designed to measure the foraging (functional) and population (numerical) responses of six seabird species to fluctuating forage fish densities at three colonies in Cook Inlet.

Funding for this project is from three major sources: EVOS Trustee Council, Minerals Management Service ($160K), and National Biological Service ($90K). For FY97 the Minerals Management Service , and National Biological Service funding may not be available. The FY97 proposed budget reflects this by an increase of about $300K from FY96. If Minerals Management Service , and National Biological Service funding becomes available these additional funds will not be needed.

1997

Project Number: 97163M
Project Title: Response of Seabirds to Forage Fish Density
Agency: NBS

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	Name	Position Description					
	J. Piatt	PI	13	11.0	5,000		55.0
		Wildlife Biologist	11	8.0	4,025		32.2
	van Pelt	Biotech.	7	8.0	3,425		27.4
		Biotech.	5	8.0	2,866		22.9
		Biotech.	5	8.0	2,866		22.9
		Biotech.	5	8.0	2,866		22.9
		Biotech.	5	8.0	2,866		22.9
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		59.0	23,914	0	
						Personnel Total	$206.2

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	Description					
	volunteers (6)			300	24	7.2
	volunteers RT airfare to Anchorage	933	6			5.6
	Anchorage to Homer	180	15	14	225	5.9
	six days vessel charter @ $2.0K/day					12.0
	aircraft charter (radio telemetry)					15.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$45.7

1997

Project Number: 97163M
Project Title: Response of Seabirds to Forage Fish Density
Agency: NBS

FORM 3B
Personnel & Travel DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
M/V Pandalus (ADF&G research vessel)	40.0
Research Work Order, UC Irvine	23.3
University of Alaska, Kasitina Bay Lab.	20.0
Boat overhaul and outfitting	25.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$108.3

Commodities Costs:	Proposed
Description	FFY 1997
food for Chisik Is. field camp	1.5
food for Kastina Is. field camp	12.0
satellite imagery	5.0
fuel (gas, diesel, and Blazo)	4.0
Whaler operations (repair and maintenance)	2.0
Kulak Clipper operations	4.0
safety training	10.0
Commodities Total	$38.5

1997

Project Number: 97163M
Project Title: Response of Seabirds to Forage Fish Density
Agency: NBS

FORM 3B
Contractual & Commodities
DETAIL 4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
hydroacoustics (Biosonics DT4000)			35.0
computer (133 Mhz, for acoustics)			6.0
digital bathythermograph (10)			2.0
small mesh gillnet (3)			1.4
flotation suits (4)			2.6
laptop computer (2 for surveys)			3.0
software for bird survey data entry			0.8
GPS (military precision)			3.0
radio telemetry equipment			16.0
cellular phone (2)			0.8
VHF radio (2)			1.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$71.6

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163M
Project Title: Response of Seabirds to Forage Fish Density
Agency: NBS

FORM 3B
Equipment
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$15.9	$21.7						
Travel	$1.5	$2.5						
Contractual	$1.0	$3.6						
Commodities	$1.6	$1.7						
Equipment	$0.0	$0.5						
Subtotal	$20.0	$30.0						
General Administration	$1.4	$3.5						
Project Total	$21.4	$33.5	$22.5					
Full-time Equivalents (FTE)	1.0	1.3						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

This study will help determine: 1) Which parameters of breeding performance are most sensitive to food supply?
2) At what stage or stages of the breeding season are the effects of food limitation most evident?
3) Is food limiting the productivity of kittiwakes on Middleton Island?

1997

Project Number: 97163N
Project Title: Black-Legged Kittiwake Controlled Feeding Experiment
Agency: NBS

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	M. Romano	graduate research assistant		12.0	1,108		13.3
		volunteer field assistant		3.0	1,000		3.0
		tuition for graduate research assistant, $1,681/spring term					5.4
		and $1,849/fall-winter semester					0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		15.0	2,108	0	
						Personnel Total	$21.7

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	Oregon to Anchorage	733	3	10	26	2.5
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$2.5

1997

Project Number: 97163N
Project Title: Black-Legged Kittiwake Controlled Feeding Experiment
Agency: NBS

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
rent summer lodging and lab space	3.6
When a non-trustee organization is used, the form 4A is required. Contractual Total	$3.6

Commodities Costs:	Proposed
Description	FFY 1997
food @ $120/week	1.5
misc. supplies	0.2
Commodities Total	$1.7

1997

Project Number: 97163N
Project Title: Black-Legged Kittiwake Controlled Feeding Experiment
Agency: NBS

FORM 3B
Contractual & Commodities
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
large capacity freezer			0.5
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.5

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163N
Project Title: Black-Legged Kittiwake Controlled Feeding Experiment
Agency: NBS

FORM 3B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$0.0	$0.0						
Travel	$0.0	$0.0						
Contractual	$20.0	$31.5						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$20.0	$31.5						
General Administration	$1.4	$2.2						
Project Total	$21.4	$33.7	$21.4	$21.4	$21.4			
Full-time Equivalents (FTE)	0.0	0.0						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

This project will provide guidance on study design, insure appropriate statistical inferences, and assistance during statistical analysis of data and in report preparation.

The total FY96 budget for this project will increase by $10,000 to accommodate additional projected project statistical review. The $10,000 will be transferred from 96163I. These additional costs will be reflected in personnel and travel.

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/	Months	Monthly		Proposed
	Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1997
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		0.0	0	0	
						Personnel Total	$0.0

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
						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

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed FFY 1997
Description	
Statistical review contract	20.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$20.0

Commodities Costs:	Proposed FFY 1997
Description	
Commodities Total	$0.0

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: NOAA

FORM 3B
Contractual & Commodities
DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: NOAA

FORM 3B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$16.1	$26.4						
Travel	$3.2	$4.7						
Contractual	$0.0	$0.0						
Commodities	$0.7	$0.5						
Equipment	$0.0	$0.0						
Subtotal	$20.0	$31.6						
Indirect	$0.0	$0.0						
Project Total	$20.0	$31.6	$20.0	$20.0	$20.0			
Full-time Equivalents (FTE)	0.1	0.2						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

This project will provide guidance on study design, insure appropriate statistical inferences, and assistance during statistical analysis of data and in report preparation. The PI is a member of the Nearshore Vertebrate Predator project and will coordinate nearshore sampling in so far as possible.

The total FY96 budget for this project will increase by $10,000 to accommodate additional projected project statistical review. The $10,000 will be transferred from 96163I. These additional costs will be reflected in personnel and travel.

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: Western EcoSystems Technology

FORM 4A
Non-
Trustee
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			Months	Monthly		Proposed
	Name	Position Description	Budgeted	Costs	Overtime	FFY 1997
	L. McDonald	Senior Biometrician	1.4	14,400		20.2
		Biometrician II	0.6	10,400		6.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	2.0	24,800	0	
					Personnel Total	$26.4

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
	DIA to Anchorage	900	3			2.7
	meal per diem			12	35	0.4
	hotel per diem (winter)			6	75	0.5
	hotel per diem (summer)			6	110	0.7
	car rental			12	35	0.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$4.7

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: Western EcoSystems Technology

FORM 4B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
Contractual Total	$0.0

Commodities Costs:	Proposed
Description	FFY 1997
long distance telephone	0.3
shipping, postage, supplies	0.2
Commodities Total	$0.5

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: Western EcoSystems Technology

FORM 4B
Contractual & Commodities
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage:	Number	
Description	of Units	

1997

Project Number: 97163O
Project Title: APEX: Statistical Review
Agency: Western EcoSystems Technology

FORM 4B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$0.0	$0.0						
Travel	$0.0	$0.0						
Contractual	$20.0	$22.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$20.0	$22.0						
General Administration	$1.4	$1.5						
Project Total	$21.4	$23.5	$25.7					
Full-time Equivalents (FTE)	0.0	0.0						
Other Resources	Dollar amounts are shown in thousands of dollars.							

This project will help determine if sand lance populations in Prince William Sound continue to be damaged by residual Exxon Valdez oil.

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: NOAA

FORM 3A
AGENCY
PROJECT
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FFY 1997
	Name	Position Description					
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		0.0	0	0	
						Personnel Total	$0.0

Travel Costs:		Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FFY 1997
	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
					Travel Total	$0.0

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: NOAA

FORM 3B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed FFY 1997
Description	
PAH contamination assessment contract	22.0
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$22.0

Commodities Costs:	Proposed FFY 1997
Description	
Commodities Total	$0.0

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: NOAA

FORM 3B Contractual & Commodities DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: NOAA

FORM 3B
Equipment
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997	LONG RANGE FUNDING REQUIREMENTS					
			Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	Estimated FFY 2003
Personnel	$6.4	$8.3						
Travel	$1.6	$1.7						
Contractual	$12.0	$12.0						
Commodities	$0.0	$0.0						
Equipment	$0.0	$0.0						
Subtotal	$20.0	$22.0						
Indirect (0%)	$0.0	$0.0						
Project Total	$20.0	$22.0	$24.0					
Full-time Equivalents (FTE)	0.1	0.1						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

This project will help determine if sand lance populations in Prince William Sound continue to be damaged by residual Exxon Valdez oil.

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: Columbia Analytical Services

FORM 4A
Non-Trustee
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:			Months	Monthly		Proposed
	Name	Position Description	Budgeted	Costs	Overtime	FFY 1997
	J. Anderson	PI	0.4	11,500		4.6
	K. Bothner	marine scientist	0.8	4,600		3.7
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	1.2	16,100	0	
					Personnel Total	$8.3

Travel Costs:		Ticket	Round	Total	Daily	Proposed
	Description	Price	Trips	Days	Per Diem	FFY 1997
	Clarsbad, CA to Anchorage and return	1,000	1	4	165	1.7
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$1.7

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: Columbia Analytical Services

FORM 4B
Personnel
& Travel
DETAIL

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed FFY 1997
Description	
PAH contamination analysis contract	12.0
Contractual Total	$12.0

Commodities Costs:	Proposed FFY 1997
Description	
Commodities Total	$0.0

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: Columbia Analytical Services

FORM 4B Contractual & Commodities DETAIL

4/12/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FFY 1997
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	

1997

Project Number: 97163P
Project Title: PAH Contamination of Forage Fish
Agency: Columbia Analytical Services

FORM 4B
Equipment
DETAIL

Genetic Discrimination of Prince William Sound Herring Populations

Project Number:	97165
Restoration Category:	General Restoration
Proposer:	Alaska Department of Fish and Game
Lead Trustee Agency:	Alaska Department of Fish and Game
Cooperating Agencies:	None
Duration:	3rd year, 4-year project
Cost FY 97:	121,900
Cost FY 98:	56,000
Geographic Area:	Prince William Sound
Injured Resource/Service:	Pacific herring

ABSTRACT

The Prince William Sound herring fishery has been in catastrophic decline since 1992. The Alaska Department of Fish and Game recovery effort includes incorporating a knowledge of genetically-derived population structure into harvest management. In this continuing project we are delineating the structure of Prince William Sound population(s) and related North Pacific populations using both nuclear and mitochondrial DNA analyses. Tests for temporal and spatial diversity within years and temporal stability across years will be conducted.

INTRODUCTION

Pacific herring *Clupea pallasi* are a major resource in Prince William Sound from both a commercial and ecological perspective. The timing of the *Exxon Valdez* oil spill (EVOS) overlapped the annual spring migration of herring spawners to nearshore staging areas. Over 40% of the herring spawning, staging, and egg deposition areas and over 90% of the documented summer rearing and feeding areas were lightly to heavily oiled prior to the spawning events. As a result, herring encountered oil during each of their four life stages in 1989 and, to a lesser extent, in 1990. Adult herring traversed oil sheens and mousse while traveling northward and eastward. Eggs were deposited on oiled shorelines and were exposed to sheen through tidal action while incubating. Larvae that hatched contained lipophilic petroleum hydrocarbons in their yolk sacs and encountered sheen near the surface while in their most sensitive state. Post-larval or juvenile herring swam through and remained near lightly to heavily oiled shorelines, regularly encountering sheen, mousse and dissolved oil components through the summer while feeding in shallow nearshore bays and passes.

The Prince William Sound herring fishery has been in catastrophic decline since 1992. In 1993, the total observed spawning population was less than one-third of preseason predictions; and the average sizes of herring in each age class were some of the smallest on record. Only limited commercial herring fishing occurred. Preliminary pathology results implicated viral hemorrhagic septicemia (VHS) as a potential source of mortality and stress; however, this has not been shown conclusively (Meyers et al. 1994). In 1994, as in 1993, the spawning population was below preseason predictions. No recovery was evident in 1995, and based on this, the 1996 commercial fishing season was cancelled. Aerial surveys since 1993 indicate that the population has remained below threshold harvest levels. The ex-vessel value of the herring fisheries in 1992 was $12.0 million. In 1993, the ex-vessel value dropped to $2.0 million, and herring abundance is so low that no commercial harvest has been permitted since.

Alaska Department of Fish and Game is mobilizing a recovery effort that includes pathology, genetics, early life history, and oceanographic investigations. The Department drafted a stock model (Brown and Wilcock 1994) to provide a basis for restoration management. However, that model is based upon several assumptions about the population structure of and recruitment to Prince William Sound spawning groups. This proposal was designed to evaluate those assumptions which include genetic homogeneity of herring stocks within the Sound and no recruitment to those stocks from outside of the Sound.

Incorporating genetically derived population structure is crucial to the success of any fisheries or restoration program. Consistent exploitation of mixed populations has to lead to the demise of the least productive stocks (Schweigert 1993). Unfortunately, defining the population structure of herring has been particularly difficult. There is evidence that herring home (Wheeler and Winters 1984), but straying may also be substantial. Morphological and meristic differentiation of herring from discrete geographic regions has been used as evidence for the existence of genetically distinct populations, but much of this variation may be environmentally mediated and has not been confirmed with genetic data (Safford and Booke

1992; King 1985).

Allozyme electrophoresis has proven to be the most useful tool for delineating the population structure of many commercially important species in Alaska. However, previous surveys of herring using this technique have generally revealed differentiation only over broad geographic regions (Grant 1984; Grant and Utter 1984) or between spawning populations within the same area that are temporally isolated (Kornfield et al. 1982). Allozymes defined two distinct races of Pacific herring (Asian/Bering Sea and eastern North Pacific), with further subdivision between the Gulf of Alaska and more southerly North Pacific stocks (Grant and Utter 1984). Also, allozyme markers were used to describe genetic divergence among local spawning populations of Pacific herring in the vicinity of northern Japan (Kobayashi et al. 1990) and among genetically distinct fjord populations in Norway (Jorstad et al. 1994).

Additional techniques to study the structure of natural populations became available in recent years as a result of advances in molecular biology. Restriction fragment length polymorphism (RFLP) analysis of mitochondrial DNA provided some evidence of genetic differentiation among Atlantic and Pacific herring (Kornfield and Bogdanowicz 1987; Schweigert and Withler 1990; Dahle and Eriksen 1990); however the utility of these and more recently developed techniques to detect fine genetic structure in Pacific herring has not been properly assessed. Peer reviewers of preproposal 95165 recommended that, of the molecular techniques then considered by our laboratory, we focus upon microsatellite markers as being potentially the most useful markers for investigation of fine structure. Microsatellites are nuclear loci amplified by PCR which are comprised of regions with variable number of tandem repeats (VNTR) of short base sequences, usually <100bp in total length.

Incorporating peer review comments, and in consideration of the fact that nuclear and mitochondrial loci evolve in response to different pressures, we are pursuing a combination of both mitochondrial and microsatellite approaches to more accurately define the stock structure of herring from the EVOS-affected area (e.g., Roff and Bentzen 1989; Bentzen et al. 1993a; Bentzen et al. 1993b; Taylor and Bentzen 1993; Wright 1993; Bentzen et al. 1994; Wright and Bentzen 1994; O'Reilly and Wright 1995). The data may also be used to estimate the population composition of non-spawning aggregations contributing to the fisheries in Prince William Sound. We are currently working under contract (FY95 funds) with the University of Washington Marine Molecular Biotechnology Laboratory and Dalhousie University Marine Gene Probe Laboratory to develop both mtDNA and microsatellite markers for use in examining Pacific herring population structure. These laboratories have developed mtDNA and microsatellite markers and are in the process of analyzing samples collected during the 1995 spawning returns. Pending results of these analyses, we may exercise our option to renew these contracts with current FY96 funds for analyses of samples collected during 1996. Our plans for FY97 include conducting analyses of remaining 1996 and 1997 samples in our own laboratory.

NEED FOR THE PROJECT

A. Statement of Problem

The Prince William Sound herring fishery is in serious decline. The lack of commercial harvest since 1993 has had severe negative impacts on individual fishermen as well as the economies of the communities within Prince William Sound.

B. Rationale/Link to Restoration

Pacific herring are a major resource in Prince William Sound (PWS) from both commercial and ecological perspectives. During the last 15 years the five commercial herring fisheries in PWS had an average annual combined ex-vessel value of $8.3 million (Donaldson et al. 1993). Pacific herring provide important forage for many species including some species severely injured by the *Exxon Valdez* oil spill. Predator species include humpbacked whales, seals, sea lions, gulls, sea ducks, shorebirds, halibut, salmon, rockfishes, and other fishes. In addition, several thousand pounds of herring and herring spawn-on-kelp are harvested annually for subsistence purposes and form an important part of the local native culture of the villages of Chenega and Tatitlek.

The goal of this project is to improve the accuracy of current stock assessment methods, thus improving resource management. Improved accuracy of stock distribution information will allow fishery managers to make fine adjustments of fishing quotas to harvest the maximum available surpluses with the lowest possible risk of overharvest, damage to the resource, or economic loss to the fishing industry. This information is also needed to help interpret oil spill damage results.

C. Location

Field research will be conducted primarily within the confines of Prince William Sound; exact locations will depend upon the annual distribution of spawning herring. Sampling outside of Prince William Sound will be conducted by ADF&G area staff as appropriate. Laboratory sampling, tissue archiving, and data analysis will be conducted at the ADF&G area office in Cordova and regional office in Anchorage.

Because commercial and subsistence herring harvests represent substantial contributions to local economies, intensive management is expected to benefit all communities in PWS. Restoration efforts can be directed and evaluated through improved fishery management and continued resource monitoring.

COMMUNITY INVOLVEMENT

Laboratory analyses and reporting are technical pursuits that will be conducted by or

supervised by Ph.D. scientists and contractors. Wherever possible, local-hire will be used to fill field positions required for sampling or routine laboratory positions. The project will be moved to the Alaska Sealife Center in Seward, should the project duration overlap with the availability of that facility. Again, local hire will be used when possible, and ADF&G plans to participate in all of the educational and outreach programs scheduled for the Center.

PROJECT DESIGN

A. Objectives

Our overall objective is to provide a genetic basis for the stock model used by Alaska Department of Fish and Game to manage and restore the depleted herring resource in Prince William Sound. We propose to test for genetic heterogeneity among spawning aggregations of Pacific herring within Prince William Sound, adjacent to Prince William Sound in the Gulf of Alaska and the Bering Sea, and between year classes within and adjacent to the Sound. Achieving this objective will provide information to enable resource managers to better understand herring population dynamics and make management decisions to speed the recovery process. In addition, it will aid local resource users to make appropriate pre-season plans based on accurate and precise herring projections.

The working objectives of this study are to:

1. Screen population samples using both mitochondrial and nuclear DNA approaches. Techniques will include RFLP analysis of mitochondrial DNA and analysis of microsatellite loci.

2. Evaluate the null hypothesis that a single panmictic population of herring exists in Prince William Sound. The study will include at least four putative population samples from both spatial and temporal isolates within the Sound.

3. Evaluate the structure of Prince William Sound herring populations within the context of the structure of adjacent spawning aggregates (up to four), including comparisons from across the known genetic barrier of the Alaska Peninsula.

4. Test for inter-annual stability of allele frequencies in Prince William Sound and related North Pacific populations.

B. Methods

1. Field Collections

   Earlier versions of this proposed project focused solely upon populations within Prince William Sound. Peer reviewers recommended expanding the project to include

outgroups from the Gulf of Alaska and the Bering Sea and to include tests for inter-annual stability (cf., Kornfield et al. 1982, see below).

During 1995, field collections of spawning Pacific herring targeted eight representative sites within and adjacent to Prince William Sound. The collection sites within Prince William Sound were chosen to maximize the potential genetic differentiation among temporally and spatially isolated spawning aggregations. Tissue extracts from muscle, liver, eye, and heart were collected and preserved in liquid nitrogen for transport to -80° C freezers for archiving. A second year of sampling (1996) will be conducted at each site to test for inter-annual stability of gene frequencies.

The within-Sound sampling efforts in 1995 targeted Rocky Bay, a southcentral spawning isolate on Montague Island; St. Matthews Bay, a southeast isolate; Fish Bay, a northeast isolate, and Port Chalmers on Montague Island (Figure 1). Efforts to sample both early- and late-spawning stocks within these four sites were unsuccessful in 1995 due to the timing of the spawning returns and inclement weather conditions which hindered early collection efforts. Single collections were made in these spawning sites. Early-spawning isolates were collected from St. Matthews Bay and Fish Bay, and late-spawning isolates were collected from Rocky Bay and Port Chalmers. Collection plans for 1996 include resampling of St. Matthews Bay, Fish Bay, Rocky Bay and Port Chalmers for both early- and late-spawning stocks if feasible, and a collection from Kayak Island in PWS (Table 1).

One-hundred individuals will be subsampled from each aggregation during the sampling for Trustee Council Project 97166 *Herring Natal Habitat.* Consequently, age and other data will be collected from the individuals analyzed for genetic variation, facilitating further correlation analyses between population data and genetic variation.

Sampling outside of Prince William Sound will include Kodiak Island, populations thought to share an ancestral tie with Prince William Sound populations (John Wilcock, Alaska Department of Game, personal communication) and Bering Sea populations known to be genetically isolated from the other Gulf of Alaska stocks (Grant and Utter 1984; Figure 2). We plan to resample three outgroups included in the FY95 initial laboratory analyses (Kodiak, Togiak, Norton Sound). An outgroup sample collection from Sitka Sound was obtained in March 1996, and Port Moller is planned as an additional outgroup for 1996 (Table 1). Muscle tissue from 100 individuals will be collected from each of these outgroup populations.

2. Genetic Analysis

The preproposal for this project included allozyme analysis as well as DNA analysis; however, peer reviewers recommended that year one of the study focus on techniques such as microsatellite analysis to maximize the probability of identifying genetic differences (as described herein). Through further public review we decided to collect

and archive samples in 1995 for allozyme analysis because the area affected by EVOS is adjacent to the genetic barrier zone identified by allozymes and the loss of the opportunity to compare allozyme results to DNA results would be irretrievable (W. S. Grant, National Marine Fisheries Service, personal communication). Allozyme-quality tissues collected in 1995 were archived at -80° C.

Alaska Department of Fish and Game solicited assistance from outside laboratories for the genetic analyses following standard State of Alaska procurement procedures for Project 95165 analyses. A request for proposal was issued for the molecular analyses, and contracts granted to two university laboratories. At this writing ADF&G is working under contract with Dr. Paul Bentzen at the University of Washington for mtDNA and Dr. Jonathan Wright at Dalhousie University for microsatellite marker development under Trustee Council approved Project 95165 funding. Because of the timing of the awarding of this contract, final results are not expected until after the contract closure date of September 30, 1996. However, preliminary results are provided in the 95165 annual report to the Trustee Council.

We chose the current contract laboratories for their joint proposal which incorporated both mtDNA and microsatellite analyses. The Principal Investigators in these laboratories have published extensively in this area, applying both mtDNA and microsatellite methods to questions of population structure (e.g. Roff and Bentzen 1989; Bentzen et al. 1991; Bentzen et al. 1993a; Bentzen at al. 1993b; Bentzen and Wright 1993; Wright 1993; Bentzen et al. 1994; Wright and Bentzen 1994; Morris et al.1996).

Alaska Department of Fish and Game plans to evaluate the option of renewing current contracts for 1996 sample analyses after reviewing the results of project 95165. We plan to exercise the option of conducting FY 97 analyses in-house after reviewing the results of Project 95165.

C. Cooperating Agencies, Contracts and Other Agency Assistance

Laboratory analysis of samples collected but not completed under Projects 95165 and 96165 will be conducted at the Alaska Department of Fish and Game Genetics Laboratory in Anchorage during FY97. Transfer of herring microsatellite technology developed by Dalhousie University will be accomplished by a one week on-site consultation with Dr. Jonathan Wright. Transfer of herring mtDNA technology developed by the University of Washington to ADF&G will be accomplished by a one week on-site consultation with Dr. Paul Bentzen if needed.

Contracting laboratory analysis will become less efficient for the Department with the completion of laboratory facilities at the Alaska Sealife Center in Seward, and as other projects currently underway at ADF&G reach completion. Future contracts to other laboratories will only be awarded if the work cannot be done in the Seward facility.

SCHEDULE

A. Measurable Project Tasks for FY 97

April 15, 1996:	Annual report for FY95
April to May 30, 1996:	Collection of samples from spawners
July 1 to Sept. 1, 1996:	Evaluate 95165 contract results; award contract for FY96 samples
September 30, 1996:	Close out FY95 funded contract
October 1, 1996:	Begin lab analyses of FY96 samples (contract and ADF&G labs)
January - April, 1997:	Evaluate final FY95 and FY96 lab results, plan for 1997 sampling if needed, conduct lab analysis of remaining FY96 samples
April 15, 1997:	Annual report for FY96, proposal for FY98 closeout
March - May 31, 1997:	Collection of samples if needed
September 30, 1997:	Conclude laboratory analysis of remaining FY96 and FY97 samples; close out FY96 funded contracts
October 1, 1997-September 30, 1998:	Data analyses and final report

B. Project Milestones and Endpoints

September 30, 1996:	Complete mtDNA, microsatellite marker development; complete 1995 sample population survey
April 1, 1997:	Evaluate population structure of PWS and outgroups collected in 1995; evaluate 1996 sample data collected-to-date; plan for FY97 collections
April 15, 1997:	Complete evaluation of population structure from samples collected during 1995, and 1996 analyzed to-date
September 30, 1997:	Complete survey of population samples collected during 1996 and 1997; evaluate stability of population structure across years
September 30, 1998:	Close out Project 98165

C. Completion Date

Project 165 is anticipated to be completed by September 30, 1998.

PUBLICATIONS AND REPORTS

April 15, 1996:	FY95 annual report.
September 30, 1996:	progress reports in the form of manuscript submitted to journal.
April 15, 1997:	FY96 annual report.
September 30, 1998:	final report in the form of manuscript submitted to journal.

PROFESSIONAL CONFERENCES

"Nuclear DNA and the Evolutionary Genetics of Fishes, Amphibians,and Reptiles." Annual meeting, American Society of Ichthyologists and Herpetologists (ASIH), Seattle, June 26-July 2, 1997.

NORMAL AGENCY MANAGEMENT

The Alaska Department of Fish and Game spends approximately $500.0K from State of Alaska general funds annually on genetics studies. For this project, salaries and benefits of principal investigators J. Seeb and L. Seeb are fully funded by general funds; project leader S. Merkouris is funded for three months from Trustee Council funds and three months by general funds.

The Department remains heavily committed to the conduct of this study and other EVOS studies, even though limited personnel resources mandate that we seek assistance from an outside source for the FY95 and FY96 laboratory analyses described herein. State of Alaska general funds support the basic operation of and enhancements to the genetics laboratory for EVOS projects including the procurement of an Applied Biosystems Incorporated automated DNA sequencing system capable of subambient temperature operation required for studies of genetic variation including RFLP analysis ($132.0K).

Staff scientists and technicians are trained in an array of genetics analyses including allozyme and PCR-based mitochondrial and nuclear approaches. The Department maintains fourteen -80° C freezers in regional and area offices throughout the state for archival of genetic samples for allozyme and DNA analyses.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

Collection of specimens and biological data will be coordinated by ADF&G's ongoing herring research program in Prince William Sound and with the EVOS project 97166 Herring Natal Habitats. Tissue archival and biometric analyses will be coordinated among all Trustee Council projects related to genetics including 97196, 97191 and 97255.

Sharing of project results will be used to evaluate and revise current strategies for management of commercial herring fisheries if warranted. Project results will also be used to improve our understanding of results from previous oil spill damage assessment studies.

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

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

The duration of this project was originally anticipated to be two and one-half years (see Projects 94165 and 95165). This period was to cover field collections from two spawning seasons and subsequent laboratory analysis. We anticipated that laboratory analysis would be complete in FY95 and reporting to be complete in FY96.

However the start date, and thus the completion date, of this project have been elusive. The Trustee Council first made funds available during FY94 (Project 94165). The field season that year was truncated due to the surprise run failure, inadequate samples were obtained to meet most project objectives, and project start was deferred one year. No Trustee Council funds were spent on the project in FY94. We are mid-way through the contract lab analyses (Project 95165) and field season for FY96 (Project 96165) at the writing of this proposal, 97165. Some spatial isolates from within the Sound were successfully sampled during 1995, but temporal isolates were elusive because of the current run failure. Sampling from outside of the Sound was successful in 1995, and plans to pursue additional and resamplings of out-groups in 1996 are underway. We initiated laboratory analyses with the aid of a contractor in 1995, but FY95 sample collections alone are inadequate to meet all four project objectives.

At least two years of complete sampling are required to confirm interannual stability of population structure. For example, Kornfield et al. (1982) observed within-year temporal variation and within-year spatial variation in Atlantic herring populations that were not stable across year classes. Such annual variation may indicate substructure variability due to changes in larval flushing/larval retention patterns such as those described in Brown and Wilcock (1994). Thus, management recommendations made on only one year's genetic data may not be valid. Based upon sampling difficulties due to the run failure, we now believe that reporting of this project will not be complete until FY 98. The cover sheet for this proposal reflects a budget request for final sample collections and analyses for FY 97 and a data analyses and reporting close out budget for FY 98.

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PROPOSED PRINCIPAL INVESTIGATORS

A. James E. Seeb, Principal Geneticist
Commercial Fisheries Management and Development
Alaska Department of Fish and Game
Anchorage, Alaska 99518 (907) 267-2385

PROJECT RESPONSIBILITIES: Design, analysis, reporting

EDUCATION:
B.S., Biology, 1974, University of Puget Sound
M.S., Fisheries, 1982, University of Washington
Ph.D., Fisheries, 1987, University of Washington

PROFESSIONAL EXPERIENCE:

1990-	Principal Geneticist, CFMD Division, ADF&G
1991-	Affiliate Associate Professor, U. of Alaska, Fairbanks
1988-1990	Assistant Professor, Southern Illinois University
1987-1988	Research Assistant Professor, University of Idaho
1982-1986	Graduate Research Assistant, University of Washington
1980-1982	Fish Biologist, Pacific Fisheries Research, Olympia,WA
1978-1980	Fish Biologist, Washington Department of Fisheries

SELECTED PUBLICATIONS:

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

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B. Lisa W. Seeb (L. Wishard), Statewide Geneticist

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PROJECT RESPONSIBILITIES: Biometrics, analysis, reporting

EDUCATION:

A.B. Zoology, 1973, University of California, Berkeley
M.A. Zoology, 1977, University of Montana
Ph.D. Fisheries, 1986, University of Washington

PROFESSIONAL EXPERIENCE:

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

SELECTED PUBLICATIONS:

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

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

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

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

C. **Susan E. Merkouris**, Shellfish and Marine Fishes Project Geneticist
Commercial Fisheries Management and Development
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PROJECT RESPONSIBILITIES: Field coordination, sampling, archiving, contracting, laboratory and data analyses, reporting

EDUCATION:

A.A., 1974, Liberal Arts (Honors), Golden Valley Lutheran College, Mpls., MN
B.S., 1980, Biology and Chemistry, *magna cum laude*, University of Alaska, Anchorage AK

PROFESSIONAL EXPERIENCE:

1991-	Shellfish and Marine Fishes Project Geneticist, CFMD, ADF&G
1989-1991	Lower Yukon Asst. Mgmt. Fisheries Biologist, C.F., ADF&G
1985-1989	Norton Sound Asst. Mgmt. Fisheries Biologist, C.F., ADF&G
1981-1985	Fisheries Biologist, C.F., ADF&G
1979-1981	Fisheries Technician, C.F., ADF&G
1976-1980	Clinical Microbiologist, Norton Sd.Regional Hospital, Nome, AK

SELECTED PUBLICATIONS AND PRESENTATIONS:

Merkouris, S. E. and L. W. Seeb. (in prep). Genetic variation of highly exploited Tanner crabs, *Chionoecetes bairdi* and snow crabs, *C. opilio* in Alaska. Submitted to Fishery Bulletin.

Seeb, L. W. and S. E. Merkouris. (in prep). Hybridization between highly exploited tanner and snow crabs, *Chionoecetes bairdi* and *C. opilio*, in the Bering Sea. Preliminary results presented at Genetics of Subarctic Fish and Shellfish International Symposium, Juneau, AK, 1993.

Merkouris, S. E. and C. F. Lean. 1989. Annual Management Report 1988 Norton Sound - Port Clarence - Kotzebue. Alaska Department of Fish and Game, Regional Information Report Series, RIR # 3N89-10.

Bergstrom, D. J., S. E. Merkouris, K. Schlutz, R. Holder, G. Sandone, D. Schneiderhan, L. H. Barton, and D. Mesiar. 1991. Annual Management Report Yukon Area, 1989. Alaska Department of Fish and Game, Regional Information Report Series. RIR #3A91-14.

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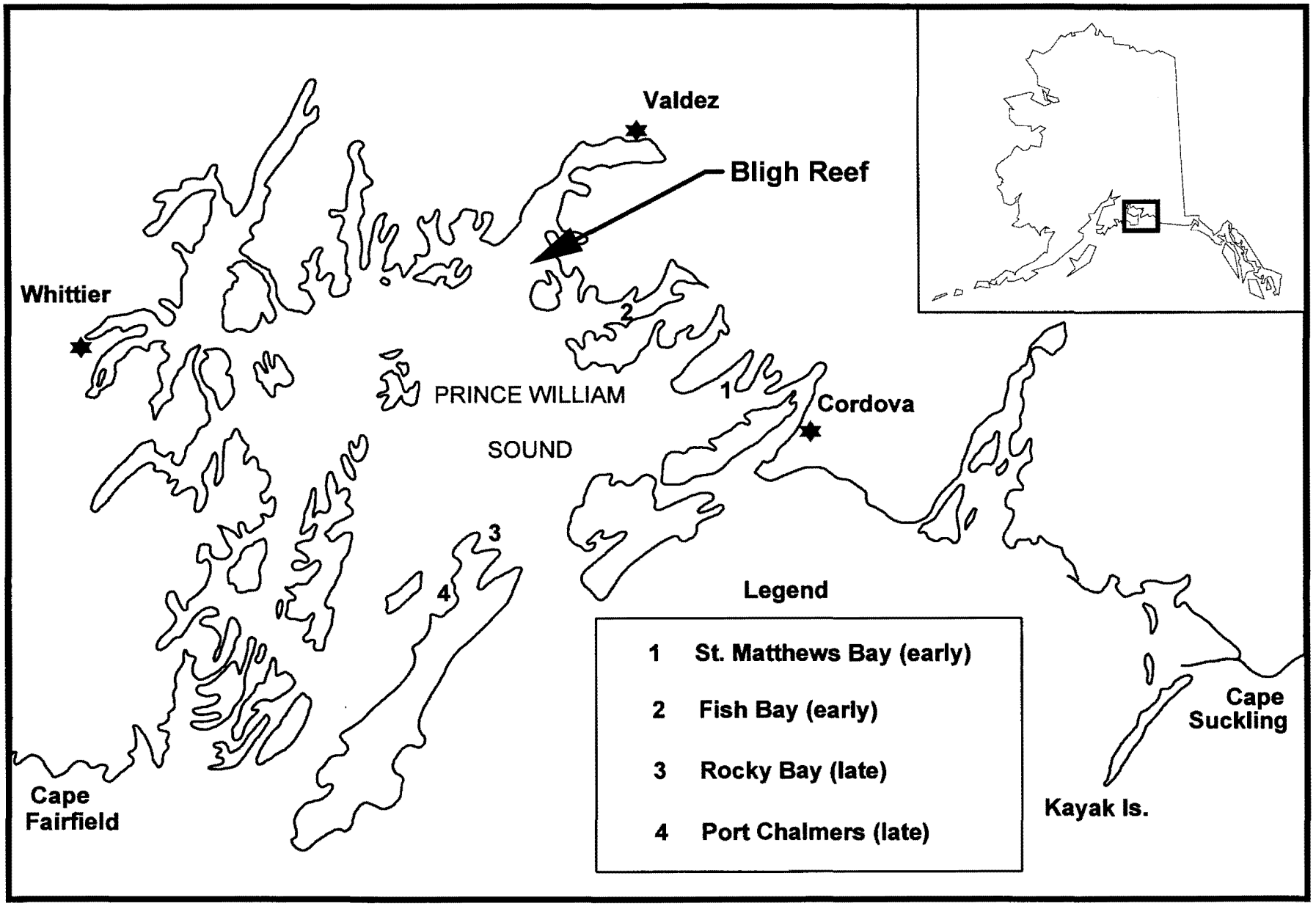
Table 1. Description of Pacific herring samples collected or proposed for Project 165. Location number corresponds to Figures 1 and 2.

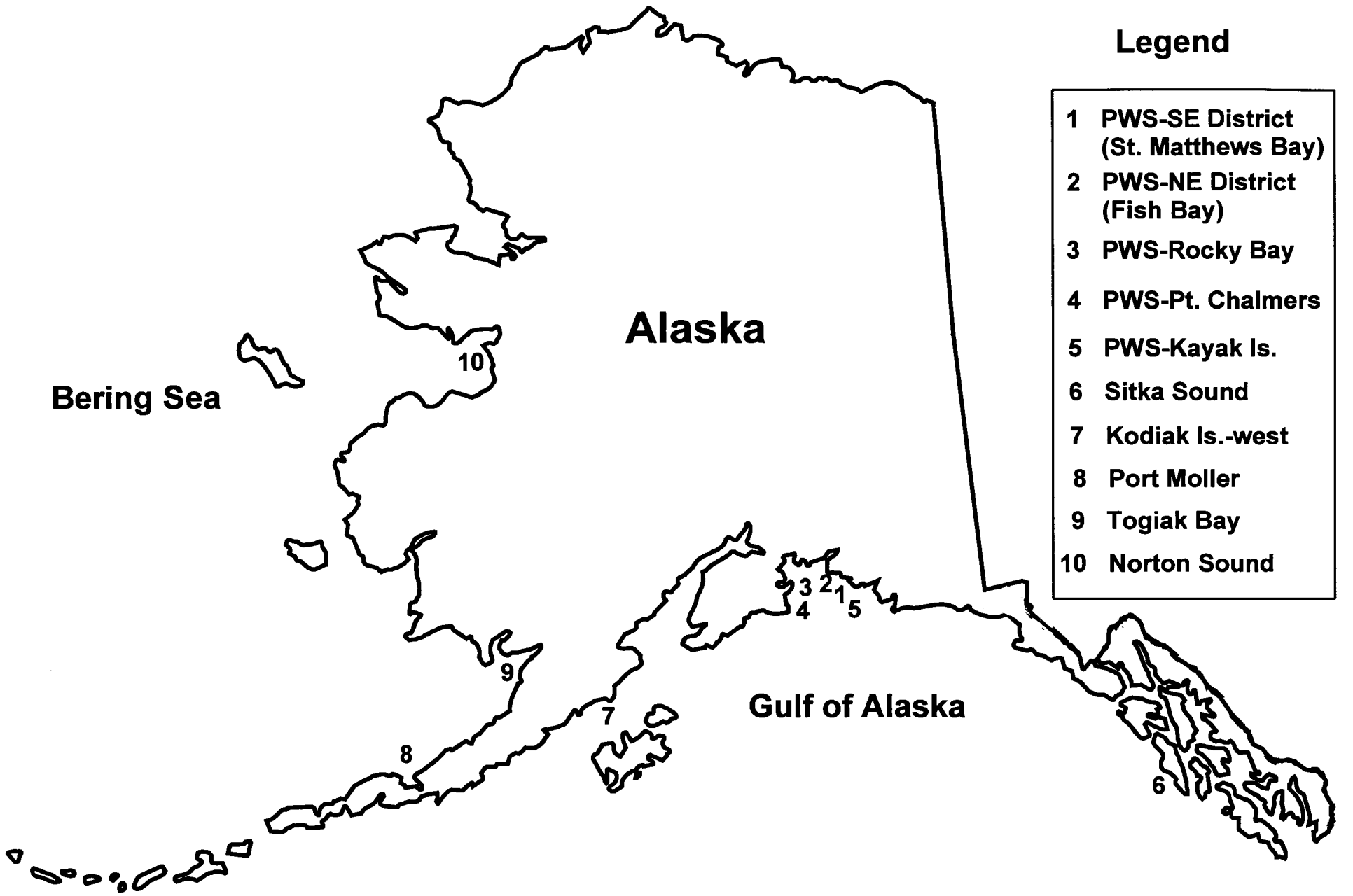
Location Number	N	Dates Sampled[1]	Lat. N.	Long. W.	Location
1	100	4/95	60°42'	146°20'	St. Matthews Bay, early
	100	4/96			St. Matt. Bay, early
	100	4/96			St. Matt. Bay, late
2	100	4/95	60°49'	146°25'	Fish Bay, early
	100	4/96			Fish Bay, early
	100	4/96			Fish Bay, late
3	100	4/95	60°21'	147°07'	Rocky Bay, late
	100	4/96			Rocky Bay, late
	100	4/96			Rocky Bay, early
4	100	4/95	60°15'	147°13'	Port Chalmers, late
	100	4/96			Port Chalmers, late
	100	4/96			Port Chalmers, early
5	100	4/96			Kayak Island
6	100	3/96	57°00'	135°30'	Sitka Sound
7	90	5/95	58°06'	153°04'	Kodiak Island
	100	5/96			Kodiak Island
8	100	5/96			Port Moller
9	100	5/91	58°50'	160°24'	Togiak Bay
	100	5/96			Togiak Bay
10	100	5/91	63°54'	160°50'	Norton Sound
	100	5/96			Norton Sound

[1] 1996 dates are proposed sample collections

Figure 1. Prince William Sound 1995 sample collection sites.

Figure 2. Collected and proposed sampling sites for Prince William Sound, Gulf of Alaska, and Bering Sea.


Valdez
Bligh Reef
Whittier
PRINCE WILLIAM
SOUND
Cordova
Cape
Fairfield
Cape
Suckling
Kayak Is.
Legend
1 St. Matthews Bay (early)
2 Fish Bay (early)
3 Rocky Bay (late)
4 Port Chalmers (late)


Legend
1 PWS-SE District (St. Matthews Bay)
2 PWS-NE District (Fish Bay)
3 PWS-Rocky Bay
4 PWS-Pt. Chalmers
5 PWS-Kayak Is.
6 Sitka Sound
7 Kodiak Is.-west
8 Port Moller
9 Togiak Bay
10 Norton Sound
Alaska
Bering Sea
Gulf of Alaska

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Budget Category:	Authorized FFY 1996	Proposed FFY 1997						
Personnel	$13.4	$57.5						
Travel	$2.2	$6.7						
Contractual	$72.0	$8.3						
Commodities	$0.7	$33.2						
Equipment	$0.0	$7.0	LONG RANGE FUNDING REQUIREMENTS					
Subtotal	$88.3	$112.7	Estimated FFY 1998	Estimated FFY 1999	Estimated FFY 2000	Estimated FFY 2001	Estimated FFY 2002	
General Administration		$9.2						
Project Total	$88.3	$121.9	$56.0					
Full-time Equivalents (FTE)		1.3						
	Dollar amounts are shown in thousands of dollars.							
Other Resources								

Comments:

1997

Prepared:

Project Number: 97165
Project Title: Genetic discrimination of PWS herring populations
Agency: AK Dept. of Fish & Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

4/15/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1997
Merkouris	FBII (PCN 1390)	16K	3.0	5350.0		16.1
	FWTIII	11D	12.0	3445.0		41.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		15.0	8795.0	0.0	
					Personnel Total	$57.5

Travel Costs:	Ticket	Round	Total	Daily	Proposed
Description	Price	Trips	Days	Per Diem	FFY 1997
Anch to Cordova, full fare	224.0	2			0.4
Anch to Cordova, advanced purchase	144.0	4			0.6
Per diem			10	150.0	1.5
Halifax, N.S. to Anch (Wright)	1000.0	1			1.0
Per diem			5	150.0	0.8
Seattle to Anch (Bentzen)	400.0	1			0.4
Per diem			5	150.0	0.8
Anch to Seattle, Professional Meeting	400.0	1			0.4
Per diem			5	150.0	0.8
					0.0
					0.0
					0.0
				Travel Total	$6.7

1997

Prepared:

Project Number: 97165
Project Title: Genetic discrimination of PWS herring populations
Agency: AK Dept. of Fish & Game

FORM 3B
Personnel
& Travel
DETAIL

4/15/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

Contractual Costs:	Proposed
Description	FFY 1997
Aircraft charter	1.5
Air freight	0.5
Photographic development	0.5
Liquid nitrogen	0.3
DNA Sequencer maintenance contract, equipment repair	5.0
Reproduction / / printing costs	0.5
When a non-trustee organization is used, the form 4A is required. **Contractual Total**	$8.3

Commodities Costs:	Proposed
Description	FFY 1997
Sampling, archiving supplies	0.7
Laboratory supplies	2.0
Biochemicals, DNA enzymes, primers	30.0
Office / presentation supplies	0.5
Commodities Total	$33.2

1997

Prepared:

Project Number: 97165
Project Title: Genetic discrimination of PWS herring populations
Agency: AK Dept. of Fish & Game

FORM 3B
Contractual & Commodities DETAIL

4/15/96

1997 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 1996 - September 30, 1997

New Equipment Purchases:		Number	Unit	Proposed
Description		of Units	Price	FFY 1997
R	Computer, pentium	1	4000.0	4.0
R	DNA equipment - microcentrifuge, vortex, power supplies	1	2000.0	2.0
	Ranin pipettor set	4	250.0	1.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.			**New Equipment Total**	$7.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

1997

Project Number: 97165
Project Title: Genetic discrimination of PWS herring populations
Agency: AK Dept. of Fish & Game

FORM 3B
Equipment
DETAIL

Prepared: 4/15/96