

PROPOSAL SIGNATURE FORM

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

By submission of this proposal, I agree to abide by the Trustee Council's data policy (Trustee Council Data Policy*, adopted March 17, 2008) and reporting requirements (Procedures for the Preparation and Distribution of Reports**, adopted June 27, 2007).

PROJECT TITLE: PWS Herring Survey: Seasonal and Interannual Trends in Seabird
Predation on Juvenile Herring

Printed Name of PI Katherine J. Kuletz

Email: kathy_kuletz@fws.gov

Mailing Address US Fish & Wildlife Service, Migratory Bird Management Division, 1011
E. Tudor Road

City, State, Zip Anchorage, AK 99503

Phone: 97-786-3453

Signature of PI: _____ Date: _____

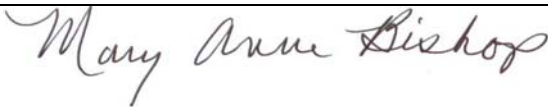
Printed Name of PI Mary Anne Bishop

Email: mbishop@pwssc.org

Mailing Address Prince William Sound Science Center

City, State, Zip Cordova, Alaska 99574

Phone: 907-424-5800 x 228

Signature of PI:  Date: 4/16/09

Printed Name of PI _____

Email: _____

Mailing Address _____

City, State, Zip _____

Phone: _____

Signature of PI: _____ Date: _____

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

** www.evostc.state.ak.us/Policies/reporting.cfm

FY10 INVITATION PROPOSAL SUMMARY PAGE

Project Title: PWS Herring Survey: Seasonal & Interannual Trends in Seabird Predation on Juvenile Herring

Project Period: October 1, 2009 – September 30, 2013.

Primary Investigator(s):

Dr. Katherine J. Kuletz, U.S. Fish and Wildlife Service, kathy_kuletz@fws.gov

Dr. Mary Anne Bishop, Prince William Sound Science Center, mbishop@pwssc.org

Study Location: Prince William Sound

Abstract:

Predation pressure on juvenile Pacific herring has been identified by the 2008 Integrated Herring Restoration Plan as one of five potential factors limiting recovery of Prince William Sound herring. Juvenile herring are heavily preyed upon by multiple species of seabirds, including six species initially injured by the *Exxon Valdez* oil spill and three species that have not yet recovered (Marbled Murrelet, Kittlitz's Murrelet and Pigeon Guillemot). This study will investigate the spatial and temporal abundance of seabird predators in and around juvenile herring schools during three time periods: August, November and March. We will also examine the physical and biological characteristics of the fish schools seabirds feed on. Our project is a component of the integrated, multi-project *PWS Herring Survey* program and relies on seabird surveys being performed on vessels associated with hydroacoustic juvenile herring surveys. Our bioenergetic models will provide estimates of juvenile herring consumption by the most important seabird predators, including inter- and intra-annual variability in consumption rates. This study will improve understanding of the role of seabird predation on herring recruitment and will help to identify candidate sites for herring supplementation efforts.

Estimated Budget:

EVOS Funding Requested (*must include 9% GA*)

FY10	FY11	FY12	FY13	Total
\$147.2	\$163.9	\$150.9	\$102.9	\$564.8

Non-EVOS Funds to be used:

FY10	FY11	FY12	FY13	Total
\$35.0 in-kind	\$35.0 in-kin	\$35.0 in-kind	\$10.0 in kind	

PROJECT PLAN

I. NEED FOR THE PROJECT

A. Statement of Problem

Pacific herring (*Clupea pallasii*) has been identified as a resource injured by the 1989 Exxon Valdez Oil Spill (EVOS). Based on population trends, the Prince William Sound (PWS) herring population does not show signs of recovering. The collapse of the PWS herring population including its commercial fishery has impacted not only the economy and well-being of PWS communities, but also a variety of seabirds and marine mammals that depend on herring. Pacific herring is a critical component of the diet of many marine mammals and seabirds in PWS (Agler et al. 1999; Matkin et al. 1999; Irons et al. 2000a). Holleman (2000) describes herring as a principal prey of at least 40 species in PWS. The PWS herring crash has been implicated in the decline of the endangered western stock of Steller sea lion (*Eumetopias jubatus*; Thomas and Thorne 2003). Kuletz (2005) concluded that juvenile herring were critical to marbled murrelets (*Brachyramphus marmoratus*) and suggested that the decline in murrelets in PWS was linked to the concurrent decline in herring. Similarly, Irons and others (2000a) determined that the effects of EVOS on several marine seabirds lasted longer than expected and may be the result of reduced forage fish abundance. In addition, Agler and others (1999) found that the most persistent declines were associated with seabirds that rely primarily on fish for their diets.

Herring populations tend to be dominated by the occasional strong year class. Most recently, the PWS 1999 herring year class showed a strong recruitment at age three (R. Thorne, PWSSC, pers. comm.), however, this recruitment event has been insufficient to restore herring populations to the levels of the 1980's. A critical bottleneck for herring recruitment is juvenile abundance and condition for young-of-the-year (hereafter referred to as 0-age class) going into and coming out of the October to March winter period, a period when zero or negative growth rates occur (Paul and Paul 1999). The 0-age class juvenile herring are heavily predated by multiple species of seabirds (Irons 1992; Duffy 2000, Bishop and Kuletz unpubl. data). Brown (2003) suggested that herring 1-year age class abundance should be directly correlated with year class strength 2 or 3 years later, unless the local population is in a "predator pit". She suggested that predation pressure resulting from a stable or increasing predator population in PWS could maintain or reduce the herring recruitment when the juvenile herring population is composed of smaller school sizes and fewer aggregations over a reduced geographic range.

In Alaska, most studies on seabirds and prey fish have been conducted in the summer, and have focused on the effect of fish abundance and quality on seabird productivity or foraging behavior (Golet et al. 2000, Litzow et al 2002, Piatt et al. 1997, Suryan et al. 2000, 2002). Outside of summer, seabird predation on herring in PWS has focused on consumption of adult herring and herring spawn. As part of the SEA project, Co-Principal Investigator for this proposal, Dr. Mary Anne Bishop, studied avian predation on herring spawn during April and May at Montague Island (Bishop and Green 1999, 2001). She collected additional spring data on adult herring consumption by birds at Montague Island during a study on avian mussel consumption (a component of the EVOS Nearshore Vertebrate Predator Project; Bishop et al. 1998). More recently, during 2005 and 2006 bird surveys were performed on vessels conducting adult herring hydroacoustic surveys in over-wintering areas. Those hydroacoustic surveys were part of a PWS Science Center study on the relationship between Steller sea lions and Pacific herring (Thorne and Thomas 2008). The spatial-temporal overlap of birds with herring was

further examined in our 2007- 2009 EVOS study, *Seabird Predation on Juvenile Herring* (Bishop and Kuletz, EVOS 814).

Juvenile herring (0, 1, 2 year olds) over-winter in several bays and inlets primarily in east-northeast and west-southwest areas of PWS that are distinct from adult over-wintering areas (Stokesbury et al. 2000; Norcross et al. 2001). Juvenile herring occur at more shallow depths than adult herring (<30m), making them potentially more available to shallow-diving seabirds. Based on previous U.S. Fish and Wildlife Service (FWS) seabird population surveys conducted during March, we identified 20 seabird species wintering in PWS that are known (15 species) or suspected (5 species) to consume juvenile herring (Table 1).

Table 1. Piscivorous birds wintering in PWS known or suspected to consume Pacific herring. Population estimates from McKnight et al. 2006.

Species	Herring documented*	EVOS Status 2006 & Recovery Date	PWS winter Population 2005
Red-throated Loon	Yes		0 **
Pacific Loon	Yes		323 ± 266
Common Loon	Yes	Recovered 2006	1233 ± 662
Yellow-billed Loon	No data		27 ± 24
Horned Grebe	No data		2203 ± 782
Red-necked Grebe	Yes		1054 ± 813
Pelagic Cormorant	Yes	Recovered 2006	10649 ± 2575
Double-crested Cormorant	Yes	Recovered 2006	154 ± 138 ***
Red-faced Cormorant	No data	Recovered 2006	458 ± 449
Common Merganser	No data		3008 ± 1558
Red-breasted Merganser	Yes		962 ± 467
Black-legged Kittiwake	Yes		15903 ± 5416
Mew Gull	Yes		8925 ± 3497
Herring Gull	No data		2030 ± 813
Glaucous-winged Gull	Yes		35363 ± 8851
Common Murre	Yes	Recovered 2002	90902 ± 23191
Marbled Murrelet	Yes	Unknown	9431 ± 3291
Kittlitz's Murrelet	Yes	Not Recovered	****
Pigeon Guillemot	Yes	Not Recovered	1485 ± 896
Horned Puffin	Yes		88 ± 158
Bald Eagle	Yes	Recovered 1996	4378 ± 840

*Based on a review of *Birds of North America* species accounts; **loons difficult to identify in winter; total loons = 2347 ± 1023;

*** total cormorants, including unidentified = 14654 ± 3089; ****Between 1990 and 2006, Kittlitz's Murrelets were observed wintering in PWS during 6 of 11 March USFWS surveys. Two were observed on the March 2009 survey (EVOS; Bishop & Kuletz unpubl data).

Foraging behavior by seabirds can be influenced by many factors including prey abundance, prey location (depth), prey size, and the presence of other herring predators. For example, marbled murrelets are the most numerous alcid in PWS. During summer, Ostrand et al. (2004) found that marbled murrelets in PWS preferentially selected for schools of juvenile herring. Murrelet's selection of other fish species for consumption depended on herring availability, rather than fish school characteristics such as fish school depth or habitat. Because their observations indicated that prey selection varied among years depending on relative

availability of preferred prey, Ostrand et al. (2004) suggested that multiple years of study were necessary to define prey selection.

Foraging in multi-species flocks is common among seabirds (Maniscalco and Ostrand 1997), and there appears to be mutual benefit gained by pursuit divers (e.g. loons, cormorants, alcids) and surface/plunge feeders (e.g. kittiwakes, gulls) by their joint participation (Porter and Sealy 1981). Co-Principal Investigator for this project, Dr. Kathy Kuletz (2005) found that murrelets in PWS foraged in larger groups when prey were less abundant, but foraged as pairs or individuals when prey was abundant, possibly because murrelets suffer kleptoparasitism by larger birds (Maniscalco and Ostrand 1997). The size of prey may also influence foraging behavior. In PWS, black-legged kittiwakes (*Rissa tridactyla*) foraged in larger flocks if prey were 0-age class herring, than they did when foraging on larger 1-age class herring (Irons et al. 2000b). In addition to fish abundance and size, hydrographic features may also play a role in attracting seabirds to a site. For example, marbled murrelets forage on small schools of fish in nearshore, shallow waters, or areas of upwelling (Kuletz et al. 1995, Kuletz 2005, Ostrand et al. 1998), presumably because prey are consistently available there. All these results suggest that group dynamics among birds is tied to fish type, abundance, and availability (as mediated by habitat).

The importance of juvenile herring as a winter food resource for birds has only recently begun to be systematically investigated. Since March 2007 our EVOS project 814, has investigated seabird predation on juvenile herring. We have conducted seabird surveys concurrent with juvenile herring hydroacoustic surveys during 5 cruises (March 2007, 2008, 2009 and November 2007, 2008). In the 7 bays where repeated hydroacoustic and bird surveys have been conducted, distributions of the most numerous seabirds appeared to reflect preferences for different herring age and size classes. Marbled murrelets closely followed the seasonal movements of juvenile herring (age 0-1). Common murrelets were most often encountered in deeper waters with aggregations of adult herring (age-3 or older). The two large gulls, glaucous-winged gull and the less numerous herring gull were opportunistic and fed in areas with large fish concentrations, regardless of location and herring age class (juvenile or adult) (Fig. 1). Cormorants were concentrated in southwest PWS bays surveyed, feeding in areas with both juvenile and adult herring schools. Loons (primarily Pacific Loon) were associated with areas where adult herring were present (Bishop and Kuletz unpubl. data).

We have also taken advantage of humpback whale predation surveys ($n = 6$ cruises) to collect additional information on seabird distribution in areas outside of the 7 bays surveyed by hydroacoustics, as well as during periods when hydroacoustic surveys are not conducted (September, October, late November, January, and early March). Although the whale surveys included only a few bays and did not measure fish school or zooplankton biomass associated with the whales, we were able to identify notable seabird hotspots. These hotspots occurred around the mouths of bays and in channels and passages between the many islands in PWS. By comparing results between the seabird/whale and seabird/hydroacoustic surveys we determined that seabird density in winter months was indeed highest within bays (Bishop and Kuletz unpubl. data).

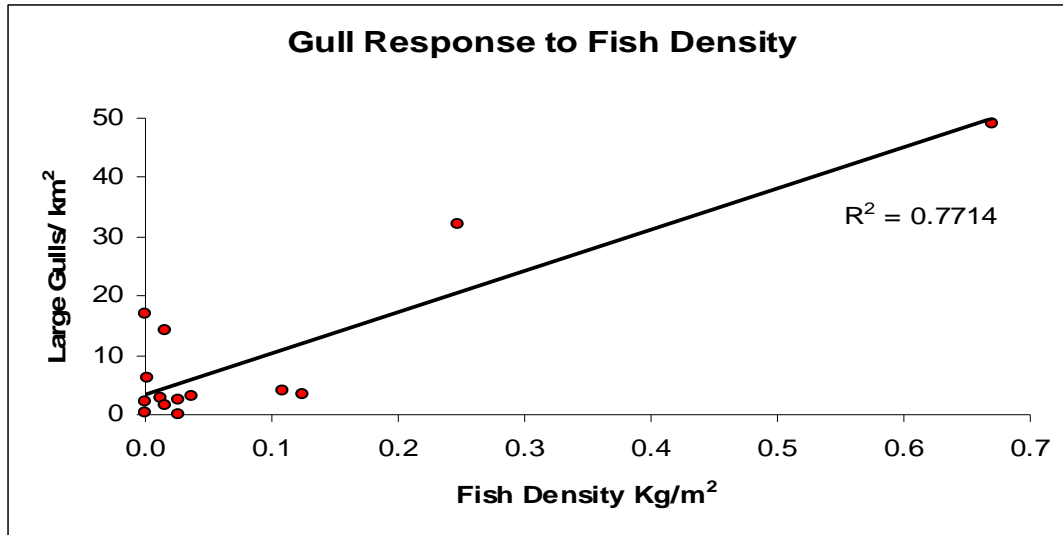


Fig. 1. Relationship between densities of large gulls (glaucous-winged gull and herring gull) and fish observed during hydroacoustic surveys in March and November 2007. Gull densities were positively related to fish densities ($R^2=0.77$, $P<0.001$).

Here we propose to continue and expand our investigation of the effects of seabird predation on juvenile herring recruitment as a component of the integrated, multi-project *PWS Herring Survey* program (for an overview of the studies included in the *PWS Herring Survey* program see proposal by W.S. Pegau). Our seabird study is designed to determine if and how seabird predation is limiting herring recovery. The *PWS Herring Survey* program is designed to sample the four SEA bays (Simpson, Zaikof, Eaglek, and Whale) as well as bays that are identified by a community fisher effort as important nursery bays. From a herring restoration standpoint, our study will provide data on bird distribution and consumption that can be used by managers to more realistically model herring recruitment and to identify potential candidate bays or locations for herring restoration. Stock assessment models can then provide an estimated range of biomass that should be available to birds, so that both bird and commercial fishery requirements do not create a “predator pit”. Our study will also be useful in identifying specific locations, or habitats, that have juvenile herring but are NOT frequented by birds. By defining these ‘herring refugia’, we can promote protection of juvenile herring habitat without impacting birds that may depend on the species where they do co-occur.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

Pacific herring has been identified as a resource injured by the 1989 Exxon Valdez Oil Spill. Currently, the PWS herring population does not show signs of recovering. The Trustee Council recognized that conservation and improved management of injured resources and services will require substantial ongoing investment to improve understanding of the marine and coastal ecosystems that support the resources, as well as the people, of the spill region. In the case of herring, this knowledge can only be provided through a long-term monitoring and research program that will span decades. Specifically, the 1994 Restoration Plan addresses the need to “Conduct research to find out why Pacific herring are not recovering” and Monitor

recovery (page 48). The plan cites the need to develop new tools to improve herring management by developing and or testing biological and physical models of herring growth and recruitment, rather than relying on empirical models.

In November 2006, a Herring Steering Committee was formed and tasked with developing a focused Restoration Program that identifies strategies to address recovery and restoration of herring, recognizing that activities in the program must span an ecologically relevant time frame that accounts for herring population dynamics and life history attributes. A draft Integrated Herring Restoration Program (IHRP) was completed in December 2008. The main goal of the program is to determine what, if anything, can be done to successfully recover the Pacific herring in PWS from the effects of EVOS. In order to determine what steps can be taken, the program examines the factors limiting recovery of herring in PWS, identifies and evaluates potential recovery options, and recommends a course of action for achieving restoration (EVOS Trustee Council 2008).

Predation is identified as one of the five potential factors limiting herring recovery in the 2008 IHRP. Predator surveys to determine the abundance and distribution of key herring predators are also one of the five components of the IHRP's proposed core data program (EVOS Trustee Council 2008). The core data program is considered the most basic information on both herring and the PWS ecosystem needed if restoration activities are to be assessed and modified. Finally, in the draft IHRP, predator management ranks second among priorities for restoration alternatives. Under that alternative, identification of the seabird predators, energetic models, and predator censuses are listed as components of the "Science Necessary" to explore this restoration option.

Based on the recommendations of the draft IHRP and in recognition that more work will be necessary to develop a full implementation of the plan, the 2010 EVOS Trustee Council Invitation for Proposals, seeks projects that address several topics. The effort proposed here is relevant to at least 3 topics outlined in the 2010 Invitation: 1) feasibility studies for herring restoration; 2) herring surveys; and, 3) restoration of injured resources and services. Under feasibility studies, predator management is considered one of the recommended alternatives for herring restoration. Information from our study on areas with high seabird predation will be important for planning, modeling, and mapping future predator management activities associated with restoration. The 2010 Invitation seeks collaborative "core data" studies to better understand 0+ juvenile herring habitat utilization, including information on predator abundance. As mentioned above the core data program outlined in the IHRP includes predation studies (EVOS Trustee Council 2008). Our study is part of *PWS Herring Survey* program, an integrated and multi-agency collaboration designed to inform future restoration efforts. In addition to our study, the *PWS Herring Survey* program is examining juvenile herring abundance, plankton availability, fish predation on herring, oceanography, herring energetics and growth, and disease. A complete description of the integrated program is included in W.S. Pegau's proposal, *PWS Herring Survey: Community Involvement, Outreach, Logistics, and Synthesis*.

Lastly, our proposal concerns several injured species that depend on herring. Juvenile herring are an important food throughout the year for the marbled murrelet, an injured species with an unknown recovery status, as well as pigeon guillemot (*Cepphus columba*), a species that has not yet recovered. Kittlitz's murrelet (*Brachyramphus brevirostris*), also a species that has not yet recovered, frequent PWS during some winters and is a documented predator of juvenile herring. Other species initially injured by the spill that feed on herring include common loon

(*Gavia immer*), cormorants (pelagic, red-faced, and double-crested), common murre and bald eagle (*Haliaeetus leucocephalus*). Thus actions that identify and protect important overwinter areas for herring will benefit multiple injured species.

II. PROJECT DESIGN

A. Hypotheses & Objectives

The overall hypothesis of the seabird predation project is that Pacific herring recruitment depends partly on the density and distribution of juvenile herring predators, including seabird predators. We will test this hypothesis by comparing juvenile herring abundance (0, 1, and 2 year olds) spatially and temporally, relative to the distribution and abundance of wintering piscivorous birds in PWS. The specific objectives are:

1. Characterize the spatial and temporal abundance of seabird predators in and around juvenile herring schools in PWS.
2. Characterize key habitats and characteristics of fish schools where seabirds overlap with juvenile herring and thus where predation may be important to overwinter survival of herring.
3. Model juvenile herring consumption by the most important seabird predators, including inter- and intra-annual variability in consumption rates.
4. Develop a long-term sampling seabird monitoring strategy for potential inclusion into the core data herring restoration effort

In meeting these objectives, we will improve understanding of the role of seabird predation on herring recruitment, and help to identify candidate sites that could be potentially used for supplementation efforts.

B. Procedural and Scientific Methods

The impact of seabird predation on juvenile herring will be documented by observing the distribution, relative abundance, and behavior of birds foraging on juvenile herring. Our seabird predator surveys are part of the *PWS Herring Survey* program, which are developing a core data collection program for herring. Our research will take place in conjunction with multi-project August, November and March cruises designed to bracket the pre-, primary, and post-winter juvenile herring populations. August cruises will include hydroacoustic surveys for juvenile herring in addition to our seabird predator surveys (see proposal by R. Thorne, *PWS Herring Survey: Assessment of Juvenile Herring Abundance and Habitat Utilization*). Each November and March cruise will include surveys of juvenile herring biomass, fish and seabird predators, plankton, oceanographic conditions in nursery bays. In addition, juvenile herring schools will be sampled for species composition, energetics and disease. During the March surveys, adult herring populations (which often occur in the same bays as juveniles) will be assessed. A seabird observer will remain onboard and survey avian predators during these adult herring hydroacoustic surveys.

Table 2. Schedule and location of seabird predator surveys. All surveys are performed in conjunction with other components of the *PWS Herring Survey* program.

Cruise Mo/Yr	Survey Areas	Additional Survey Bays
Nov 2009	Whale, Zaikof, Eaglek, Simpson	1
Mar 2010	Whale, Zaikof, Eaglek, Simpson Adult herring bays	1
Aug 2010	Broad scale Juvenile Survey	
Nov 2010	Whale, Zaikof, Eaglek, Simpson	4-5
Mar 2011	Whale, Zaikof, Eaglek, Simpson Adult herring bays	4-5
Aug 2010	Broad scale Juvenile Survey	
Nov 2011	Whale, Zaikof, Eaglek, Simpson	2
Mar 2012	Whale, Zaikof, Eaglek, Simpson Adult herring bays	2

Our seabird surveys will be conducted concurrent with daytime hydroacoustic herring surveys and onboard the same vessel. For the hydroacoustic transects a 58 ft charter vessel follows a zigzag track, approximately 200m or greater from shore, at a speed of approximately 6 knots (see R. Thorne’s proposal for hydroacoustic methods). Seabird observations are conducted along these transects, using established U.S. Fish and Wildlife Service protocols that have been adapted for GPS-integrated data entry programs (USFWS 2007). One observer will record number and behavior of birds and marine mammals occurring along a strip transect width of 300m (150m both sides and ahead of the boat). Additionally, any noteworthy observations will be recorded out to 1km either side. Observations will be recorded into a GPS-integrated laptop computer using the program Dlog (Ford Consulting, Inc., Portland OR). This program provides location data for every record as well as sea conditions and weather entered and tracked on site by the observer.

Nocturnal hydroacoustic herring surveys will repeat the same GPS-generated track lines. Both the diurnal and nocturnal hydroacoustic surveys will provide detailed information on the vertical and horizontal distribution of fish schools (including total depth of water, depth to each fish school, and depth below each school) as well as density and biomass. During nighttime surveys, fish schools observed with the acoustic equipment will be sampled by a second boat using a variable-mesh gill net (see Kline *PWS Herring Survey: Pacific Herring Energetic Recruitment Factors*). These samples will be used to characterize the age, weight, and length composition of herring schools as well as other fish species mixed in with the schools. More shallow waters will be sampled using throw nets. Additional information on fish schools will also be provided by Alaska Department of Fish and Game.

Compared with the breeding season, visual observations of seabirds foraging and bringing fish to the surface are extremely rare in winter (Bishop and Kuletz unpubl. data). Opportunistically we will identify any fish brought to the surface by foraging birds. And, when conditions allow, we will catch fish boiling at the surface (chased by the birds) using a dipnet (see Kuletz 2005). Fish captured below feeding birds will be considered potential prey items, and will provide prey species identification, size and weight. Fish brought to the surface by birds

will be visually identified to the lowest possible taxon, using study guides developed by USGS and USFWS.

C. Data Analysis and Statistical Methods

To describe the relationship between seabird densities and juvenile herring biomass in PWS we will run linear regressions, using juvenile herring survey data provided from the hydroacoustic surveys. For each bird species, a best model for explaining variability in bird densities will be determined using a general linear model. A natural log or square root transformation of the dependent variable will be used when appropriate to improve the fit of the model to the data. The relationship between date, densities of each seabird species observed, and herring biomass will be evaluated at two spatial scales: by bay and by transect.

The main hypothesis, that seabird predation on juvenile herring impacts herring recruitment, will be examined by modeling juvenile biomass among sites relative to local seabird abundance and consumption. This will be visualized using ArcMap GIS. GIS will also be used to calculate additional variables such as distance to shore, water depth, and distance to underwater sills or ledges. We will use multivariate logistic regressions to compare by year the characteristics of juvenile herring fish schools associated with seabirds to all other juvenile herring schools detected by hydroacoustics (Manly et al. 1993). Our analysis will focus on variables that appear to be important to seabird predation. These include school density, species composition and size structure, total water depth, depth to school, depth below each school, and distance from shore (Day and Nigro 2000; Ostrand et al. 1998, 2004, Kuletz 2005). School area (m^3) will also be included in the model if it becomes available. Models will be developed that are composed of all possible combinations of variables, excluding interactions. Logistic regressions will be fitted to all equations within the model set and ranked based on Akaike's information criterion (Akaike 1973, Burnham and Anderson 2002). For each year we will determine importance values for each independent variable using the model sets (Burnham and Anderson 2002).

Daily juvenile herring consumption by each species of bird will be determined using a bioenergetics model (Bishop and Green 2001) similar to that used by Madenjian and Gabrey (1995) and Hunt et al. (2000) for seabird energy requirements on Lake Erie and the Bering Sea, respectively. This model utilizes: 1) the daily energy needs of individuals of each species; 2) the abundance of each bird species at sites with juvenile herring (from our data); and, 3) the contribution of herring to the diet of each species (from on-site observations and the literature). We will use published species-specific metabolic rates (e.g. Feltham 1995) or allometric equations for each species and/or groups of species' daily energy needs (e.g. Birt-Friesen et al. 1989). Information on the condition and caloric content of juvenile herring before and after winter will be provided by the Kline's proposed study, *PWS Herring Survey: Pacific Herring Energetic Recruitment Factors* or from the literature (Paul and Paul 1999). Caloric values of other fish species consumed will be taken from the literature (Anthony et al. 2000).

We will use the following equation to calculate C , the daily juvenile herring consumption (total kg) per individual bird predator: $C = (FMR/MEC) \times P \times H$. For this equation, FMR = field metabolic rate ($\text{kJ} \cdot \text{d}^{-1}$), MEC = metabolizable energy coefficient of juvenile herring, P = estimated proportion of total energy acquired from juvenile herring and, H = biomass of juvenile herring (kg) needed to produce 1 kJ. Thus, knowing the energy requirements of each bird species, total bird numbers, the proportion of herring in their diet, and the energetic value of

different age classes of herring and other prey consumed, it will be possible to calculate an estimate of the number of herring consumed by birds.

Based on USFWS winter surveys of PWS, we determined that 20 marine bird species are potential consumers of juvenile herring (see Table 1, page 4). Of these, 15 are documented herring predators. Based on our 2007/2008 preliminary results, six species of birds that occur in PWS in the winter will likely comprise the majority of our observations and data: pelagic cormorant, black-legged kittiwake, mew gull, glaucous-winged gull, common murre, and marbled murrelet. Because visual observations of birds foraging and bringing fish to the surface are extremely rare in winter (Bishop and Kuletz unpubl. data), we will assume that fish detected or caught (via gillnets, trawls, seines, throw nets, and dipnets) in areas with foraging birds are being consumed by the birds. This is a common assumption in seabird literature, and previous studies have used these methods in PWS (Kuletz 2005). The total amount of herring consumed per bird species will be determined using the daily bioenergetics calculations (described above) for each species x total bird days in juvenile herring areas during winter. For species that show a seasonal shift in the use of herring in their diet, we will incorporate intra-annual changes into the model of seabird consumption.

Our final objective is to provide the information needed to refine the seabird predator portion of the “Core Data Collection” of the Integrated Herring Restoration Program. For the seabird predators on herring, our goal is to develop the necessary understanding to separate within and among site variability from annual patterns - the latter element critical in developing a long-term sampling strategy to address the herring restoration. At the end of the 4 year study, we will evaluate the possibility of minimizing the spatial and temporal extent of sampling, thereby reducing cost, while maintaining our ability to detect inter-annual change in seabird predator abundance. This process will also rely on data collected in the previous, March 2007-March 2009 EVOS 814 seabird predator study

D. Description of Study Area

The *PWS Herring Survey* program includes August, November, and March cruises, with an emphasis on monitoring four nursery bays Eaglek, Zaikof, Simpson, and Whale (Fig. 2). These four bays were originally selected in 1995 for intensive, three-year (1995-1998) study of juvenile herring ecology that was part of the EVOS Sound Ecosystem Assessment (SEA) program. More recently these same four nursery bays (hereafter referred to as the 4 SEA bays) were sampled during 5 winter cruises for herring biomass (Thorne EVOS 830), herring energetics (Kline EVOS 814) and seabird predators (Kuletz and Bishop EVOS 814). The *PWS Herring Survey* program will continue to sample the four SEA bays for three field seasons, beginning with the 2009/2010 winter. The first 2009/2010 winter, one additional bay along Knight Island Passage will be sampled.

As part of our *PWS Herring Survey* program, in March 2010, there will be an intensive community-fisher sampling effort to identify bays with juvenile herring. Based on the results of the community effort, 4-5 additional bays will be sampled the second 2010/2011 winter season, and for the final winter season, 2 bays will be sampled in addition to the four SEA bays. August surveys will cover several bays, whose locations will depend on results from aerial surveys of juvenile herring schools.

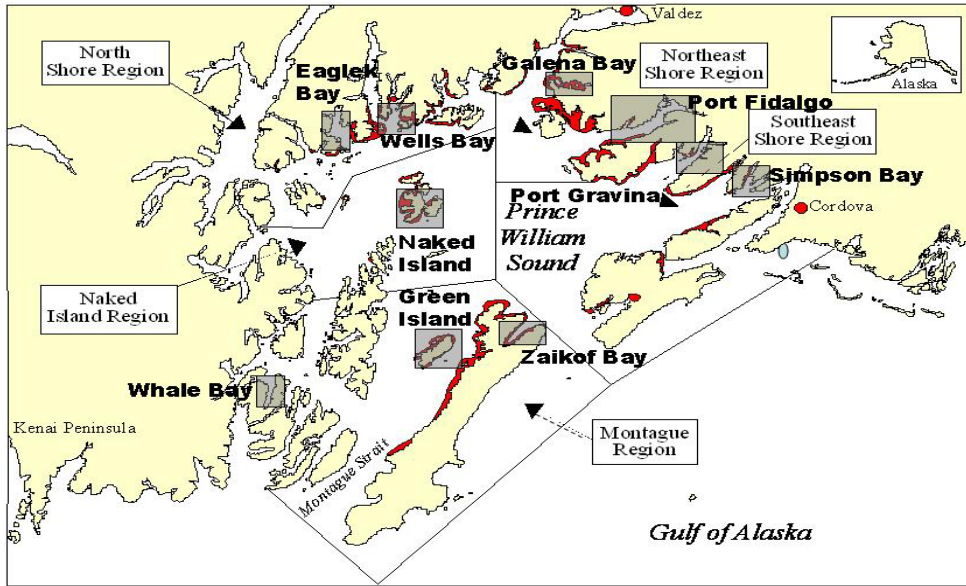


Figure 2. PWS study area, including the four SEA bays (Whale, Zaikof, Eaglek, and Simpson), as well as other bays historically important for juvenile herring. Red = historic spawning areas.

E. Coordination and Collaboration with Other Efforts

This project is one of a set that makes up the *PWS Herring Survey* program. The set of projects include:

- *PWS Herring Survey: Community Involvement, Outreach, Logistics, And Synthesis*
- *PWS Herring Survey: Sound Wide Juvenile Herring, Predator, And Competitor Density Via Aerial Surveys*
- *PWS Herring Survey: Assessment Of Juvenile Herring Abundance And Habitat Utilization*
- *PWS Herring Survey: Plankton And Oceanic Observations In PWS*
- *PWS Herring Survey: Herring Disease Program*
- *PWS Herring Survey: Physical Oceanographic Characteristics Of Nursery Habitats Of Juvenile Pacific Herring*
- *PWS Herring Survey: Pacific Herring Energetic Recruitment Factors*
- *PWS Herring Survey: Growth And Energy Allocation In Overwintering Herring*
- *PWS Herring Survey: Seasonal And Interannual Trends In Seabird Predation On Juvenile Herring*
- *PWS Herring Survey: Top-Down Regulation By Predatory Fish On Juvenile Herring*

Coordination between these projects is provided in more detail in Pegau's *Community Involvement, Outreach, Logistics, and Synthesis* proposal. In addition to shared platforms and data sharing, our proposal includes substantial effort for interaction with other projects including workshops and annual meetings. Community involvement is also incorporated into the overall effort including: (1) community-based herring sampling program (to assist with identifying candidate sites for herring restoration; see Pegau's proposal); 2) use of local vessels for charters; and, (3) community presentations of on-going research.

III. SCHEDULE

A. Project Milestones

1. Characterize the spatial and temporal abundance of seabird predators in and around juvenile herring schools in PWS. Completed September 2012.
2. Characterize key habitats and characteristics of fish schools where seabirds overlap with juvenile herring and thus where predation may be important to overwinter survival of herring. Completed September 2012
3. Model the juvenile herring consumption by the most important seabird predators, including inter- and intra-annual variability in consumption rates. Completed September 2012.
4. Develop a long-term sampling seabird monitoring strategy for potential inclusion into the core herring restoration effort. Completed April 2013.

B. Measurable Project Tasks

FY 10, 1st quarter (October 1, 2009-December 31, 2009)

- Oct Secure Trustee Council funding approval.
- Nov Field Cruise: *PWS Herring Survey*: seabird predator/fish predator/plankton/disease/energetics/hydroacoustic surveys
- Dates not yet known: EVOS meeting of Herring Principal Investigators

FY 10, 2nd quarter (January 1, 2010-March 31, 2010)

- Mar Field Cruise: *PWS Herring Survey*: seabird predator/fish predator/plankton/disease/energetics/hydroacoustic surveys

FY 10, 3rd quarter (April 1, 2010-June 30, 2010)

- Apr-Jun Analyze data
- May *PWS Herring Survey* Principal Investigator update and outreach meeting

FY 10, 4th quarter (July 1, 2010-September 30, 2010)

- Jul - Sep 30 Analyze data
- Aug Field Cruise: *PWS Herring Survey*: seabird predator/hydroacoustic surveys
- Sep 1 Submit Annual Report

FY 11, 1st quarter (October 1, 2010-December 31, 2010)

- Oct Delivery of Community Lecture
- Nov Field Cruise: *PWS Herring Survey*: seabird predator/fish predator/plankton/disease/energetics/hydroacoustic surveys
- Dates not yet known: EVOS meeting of Herring Principal Investigators

FY 11, 2nd quarter (January 1, 2011-March 31, 2011)

- Mar Field Cruise: *PWS Herring Survey*: seabird predator/fish predator/plankton/disease/energetics/hydroacoustic surveys

FY 11, 3rd quarter (April 1, 2011-June 30, 2011)

- Apr-Jun Analyze data
- May *PWS Herring Survey* Principal Investigator update and outreach meeting

FY 11, 4th quarter (July 1, 2011-September 30, 2011)

- Jul - Sep 30 Analyze data

Aug Field Cruise: *PWS Herring Survey*: seabird predator/hydroacoustic surveys
Sep 1 Submit Annual Report

FY 12, 1st quarter (October 1, 2011-December 31, 2011)

Nov Field Cruise: *PWS Herring Survey*: seabird predator/fish
predator/plankton/disease/energetics/hydroacoustic surveys
Dates not yet known: EVOS meeting of Herring Principal Investigators

FY 12, 2nd quarter (January 1, 2012-March 31, 2012)

Mar Field Cruise: *PWS Herring Survey*: seabird predator/fish
predator/plankton/disease/energetics/hydroacoustic surveys

FY 12, 3rd quarter (April 1, 2012-June 30, 2012)

Apr-Jun Analyze data
May *PWS Herring Survey* Principal Investigator update and outreach meeting

FY 12, 4th quarter (July 1, 2012-September 30, 2012)

Jul - Sep 30 Analyze data
Sep 1 Submit Annual Report

FY 13, 1st quarter (October 1, 2012-December 31, 2012)

Finish data analyses
Oct First synthesis meeting of *PWS Herring Survey* PIs

FY 13, 2nd quarter (January 1, 2013-March 31, 2013)

Jan Alaska Marine Science Symposium
2nd *PWS Herring Survey* PI integration meeting
Mar 3rd *PWS Herring Survey* PI integration meeting

FY 13, 3rd quarter (April 1, 2013-June 30, 2013)

Apr 15 Submit final synthesis report of *PWS Herring Survey* to the EVOS Trustee
office– this will consist of a draft manuscript
Apr 30 Submit first manuscript to *Marine Ornithology*.
Jun 30 Respond to peer review comments

FY 13, 4th quarter (July 1, 2012-September 30, 2012)

Jul 30 Secure final approval, acceptance of final synthesis report
Sep 30 Publication of final synthesis report complete, delivered to ARLIS
Sep 1 Submit second manuscript to *Marine Ecology Progress Series*

C. Publications & Reports

In addition to annual reports, we foresee 2 peer-reviewed publications produced from this study. Their proposed titles, journals, and submission dates are:

1. Influence of habitat on seabird consumption of juvenile herring in winter in PWS. *Marine Ornithology*. Expected submission date April 2013.
2. Intra- and interannual variability in herring consumption by seabirds in PWS: a energetic approach using empirical data. *Marine Ecology Progress Series*. Expected submission date September 2013.

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Dr. Kathy J. Kuletz

U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Phone : 907-786-3453 Email: Kathy_Kuletz@fws.gov

Academic Training

Ph.D. Biology, 2005	Univ. of Victoria, British Columbia
M. S. Ecology & Evolutionary Biology, 1983	University of California, Irvine
B. S. Wildlife Ecology, 1974	California State Polytechnic, San Luis Obispo, with Honors

Recent Professional Experience

2005-present Pelagic Observer Program Coordinator, Migratory Bird Management, USFWS
1998-2005 Alaska Seabird Specialist, Migratory Bird Management, USFWS
1989-1997 Principal Investigator, *Exxon Valdez* studies on marine birds, USFWS

Related Professional Experience

PI for Seabirds in Bering Sea Integrated Research Program (BSIERP), with NPRB grant
PI for North Pacific Pelagic Seabird Observer Program, with NPRB grant
Co-PI for 'Seabirds as Predators on Juvenile Herring', funded by EVOS in 2006-2009.
PI and Co-PI for EVOS projects on murrelets and pigeon guillemots, 1989 - 1999
PI for project on decadal changes in seabirds in Kachemak Bay (ADFG/SWG grant), 2004-2007.
International Fishers Forum (working group to reduce bycatch of seabirds and sea turtles)
Consultant on *Brachyramphus* murrelet issues (ESA listing, EVOS mitigation, USFS plans)
Scientific advisor to Alaska Audubon Society.
Assisted NOAA & NPFMC with Programmatic Environmental Impact Statements
Collaborated with NOAA and Univ. of Washington on studies of seabird bycatch in fisheries

Committees

Science & Statistical Committee of North Pacific Fisheries Management Council (2007-present)
NOAA/NPFMC Groundfish Fisheries Plan Team (2000 – 2006)
North Pacific Pelagic Seabird Database Management Team (USFWS & USGS)
Short-tailed Albatross Recovery Team (Endangered Species/ USFWS)
North Pacific Albatross Working Group
EVOS Prince William Sound Herring Working Group
Alaska Seabird Working Group
Marbled Murrelet Technical Committee, Kittlitz's Murrelet Technical Committee (PSG)

Professional Societies

Pacific Seabird Group (Secretary, 1998-1999)
American Ornithologists' Union
Society of Conservation Biologists
The Wildlife Society

Recent Collaborators

Mary Anne Bishop (Prince William Sound Science Center); Vernon Byrd (U.S. Fish and Wildlife Service); George L. Hunt, Jr. (University of Washington); David Irons (U.S. Fish and Wildlife Service); Alexander Kataysky (Univ. of Alaska, Fairbanks); John Piatt (U.S. Geological Survey, Alaska Science Center); Dan Roby (Oregon State University); Mike Sigler, Alaska Fisheries Science Center, NOAA); Andrew Trites (University of British Columbia)

Related Publications

- Kuletz, K.J. 2005. Foraging behavior and productivity of a non-colonial seabird, the Marbled Murrelet (*Brachyramphus marmoratus*), relative to prey and habitat. Ph.D. Dissertation, University of Victoria, British Columbia. 195pp
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Other Publications

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MARY ANNE BISHOP, Ph.D.
Research Ecologist,
Prince William Sound Science Center
P.O. Box 705
Cordova, Alaska 99574
907-424-5800 ext 228 (voice) 907-424-5820 (fax)
mbishop@pwssc.org

EDUCATION

- Ph.D. Wildlife Ecology, Department of Wildlife and Range Sciences, University of Florida, Gainesville, 1988.
- M.S. Wildlife and Fisheries Sciences, Department of Wildlife and Fisheries Sciences, Texas A & M University, College Station, 1984.
- B.B.A. Real Estate and Urban Land Economics, School of Business, University of Wisconsin-Madison, 1974.

RECENT PROFESSIONAL EXPERIENCE

- 6/99- Research Ecologist, Prince William Sound Science Center, PO Box 705, Cordova, Alaska
- 11/88- Principal Investigator, Tibet Black-necked Crane Project, International Crane Foundation, Baraboo, Wisconsin (job location: Tibet, People's Republic of China).
- 3/97-5/99& Research Wildlife Biologist, Copper River Delta Institute, Pacific Northwest
4/90-4/94 Research Station, U.S. Forest Service, Cordova, Alaska.
- 4/94-3/97 Research Wildlife Biologist, Center for Streamside Studies and Dept. Fisheries, University of Washington, assigned to Copper River Delta Institute, U.S. Forest Service, Cordova, Alaska.

CURRENT ACTIVITIES RELEVANT

- Co-Principal Investigator for a study to evaluate seabird predation on juvenile herring in Prince William Sound during winter FY 07-09.
- Principal Investigator for NPRB project 819: Body Condition of Marbled Murrelets: Consequences for Overwinter Survival During a Period of Collapsed Herring Stocks
- Co-Principal Investigator lingcod (*Ophiodon elongatus*) movement study using acoustic tags in Port Gravina. In October 2008, deployed an acoustic receiver array across the mouth of Port Gravina. Project funded by Pacific Ocean Shelf Tracking (POST) project and the PWS Oil Spill Recovery Institute.

SELECTED SCIENTIFIC PUBLICATIONS (10 of 42)

- Bishop, M. A.**, N. Warnock, and J. Y. Takekawa. 2006. Spring Migration Patterns in Western Sandpipers *Calidris mauri*. Pages 545-550 in G.C. Boere, C.A. Galbraith, and D.A. Stroud (eds.) Waterbirds around the world. The Stationery Office, Edinburgh, U.K.
- Bishop, M.A.**, N. Warnock, and J. Takekawa. 2004. Differential spring migration of male and female Western Sandpipers at interior and coastal stopover sites. *Ardea* 92:185-186.
- Bishop, M.A.** and S.P. Green. 2001. Predation on Pacific herring (*Clupea pallasii*) spawn by birds in Prince William Sound, Alaska. *Fisheries Oceanography* 10 (Suppl.1): 149-158

- Bishop, M.A.**, P. Meyers, and P.F. McNeley. 2000. A method to estimate shorebird numbers on the Copper River Delta, Alaska. *Journal Field Ornithology* 71(4):627-637.
- Cooney, R.T., J.R. Allen, **M.A. Bishop**, D.L. Eslinger, T. Kline, B.L. Norcross, C.P. McRoy, J. Milton, J. Olsen, V. Patrick, A.J. Paul, D. Salmon, D. Scheel, G.L. Thomas, S.L. Vaughn, and T.M. Willette. 2001. Ecosystem control of pink salmon (*Oncorhynchus gorbuscha*) and Pacific herring (*Clupea pallasii*) populations in Prince William Sound. *Fisheries Oceanography* 10(1):1-13.
- Kline, T.K., C.A. Woody, **M.A. Bishop**, S.P. Powers, E.E. Knudsen. 2007. Preliminary Assessment Of Marine-Derived Nutrients In The Copper River Delta, Alaska Using Stable Isotope Analysis . Pages 51-72 in C. A. Woody, editor. Sockeye salmon evolution, ecology and management. American Fisheries Society, Symposium 54, Bethesda, MD.
- Powers, S.P., **M.A. Bishop**, J.H. Grabowski, and C.H. Peterson. 2002. Intertidal benthic resources of the Copper River Delta, Alaska, USA. *Journal Sea Research* 47:13-23.
- Powers, S.P., **M.A. Bishop**, S. Moffitt, and G.H. Reeves. 2007. Variability in Freshwater, Estuarine and Marine Residence of Sockeye Salmon (*Oncorhynchus nerka*) within the Copper and Bering River Deltas, Alaska. Pages 87-99 in C. A. Woody, editor. Sockeye salmon evolution, ecology and management. American Fisheries Society, Symposium 54, Bethesda, MD.
- Warnock, N., J.Y. Takekawa, and **M.A. Bishop**. 2004. Migration and stopover strategies of individual Dunlin along the Pacific Flyway. *Canadian Journal Zoology* 82:1687-1697.
- Williams, T.D., N. Warnock, J. Y. Takekawa, and **M.A. Bishop**. 2007. Flyway Scale Variation in Plasma Triglyceride Levels as an Index of Refueling Rate in Spring-Migrating Western Sandpipers (*Calidris mauri*). *Auk* 124(3): 886-897.

Professional Collaboration

J. Ackerman (USGS), E. Ammann (NOAA), W. Boyce & C. Cardona (UC Davis), E. Clesceri (UNC-Chapel Hill), R. Crawford (PWSSC), D. Crowley (Alaska Dept. Fish & Game), N. Dawson (PWSSC), J. Dudley (SAIC), S.M. Gay (PWSSC), K. George (Alaska DNR), J. Grabowski (U. Maine), H. Ip (USGS), S. Iverson (USGS-BRD), T. Kline (PWSSC), E. Knudsen (USGS-BRD Anchorage), K. Kuletz (USFWS), B. Lance (NOAA), A. Lang (Intl. Crane Foundation), F. Li (Intl. Crane Foundation), S. Moffitt (Alaska Dept. Fish & Game), S. Paraoulek (Wash. Fish Wild), C. "Pete" Peterson, (Inst. Marine Sci., UNC-Chapel Hill), S. Powers (U. S. Alabama) G. Reeves (USFS Pac. NW. Res. Station & OSU), B. Reynolds (Univ. S. Alabama), G. Schirato (WA. F&W) S. Schwarzbach (USGS), S. Senner (Audubon), J. Takekawa (USGS-BRD-San Francisco), A. Taylor (UAF), G. Thomas (U. Miami) R. Thorne (PWSSC), D. Tsamchu (Tibet Plateau Institute of Biology, PR China), N. Warnock (PRBO Conservation Sciences), T. Williams (Simon Fraser Univ.), C. Woody (USGS-BRD Anchorage)

Budget Narrative

PWS Herring Survey: Seasonal & Interannual Trends in Seabird Predation on Juvenile Herring
US FISH & WILDLIFE SERVICE &
PRINCE WILLIAM SOUND SCIENCE CENTER

USFWS Personnel Salaries & Fringe Benefits

Yr 1 = \$29.0, Yr 2 = \$29.8, Yr 3 \$30.6. Yr 4 = \$ 31.8

Co-Principal Investigator Kuletz: Yrs 1-4: 2.0 mo/yr + 1 mo in-kind/yr. For this project Kuletz will assist with project design. Along with Bishop, she will be responsible for statistical analysis and data interpretation and preparation of reports, manuscripts and the seabird predator section of the *PWS Herring Survey* program synthesis. While the USFWS is the trust agency for seabirds, this project is outside of normal USFWS monitoring operations. The USFWS bird surveys are conducted under different protocols and different times of the year, therefore the surveys conducted within this study require separate funding.

Research Biological technician Yrs 1-4 2.0 mo/yr.

For this project technician will conduct GIS analyses from the cruises. This person will be hired specifically for this project, which is not part of normal USFWS operations.

USFWS Travel

Yrs 1-4 = \$2.0/yr

Co-Principal Investigator Kuletz, Anchorage - Cordova: Ticket price \$425, 2 trips, 3d/ea; to meet with Co-Principal Investigator Bishop & attend *PWS Herring Survey* Principal Investigator meetings.

Contractual/Consultants

Prince William Sound Science Center (PWSSC) Yr 1 \$103.0, Yr 2 \$117.6, Yr 3 \$104.8, Yr 4 \$59.6.

Personnel Yr 1 \$73.0, Yr 2 \$75.4, Yr 3 \$77.4, Yr 4 \$44.0

This contract is to the Co-Principal Investigator, Dr. Mary Anne Bishop, Prince William Sound Science Center. Under this contract Bishop will receive 4 mo salary per year. For this project Bishop will supervise the research assistant, assist with project design and will participate in the summer and adult herring cruises. Along with Kuletz, she will be responsible for statistical analysis and data interpretation and preparation of reports and manuscripts and seabird predator section of the *PWS Herring Survey* program synthesis. Bishop will also coordinate with the other *PWS Herring Survey* program studies;

Research Assistant, Yrs 1-3, 6 mo/yr. Assistant will conduct field cruises including assisting other PWS Herring Survey projects during cruises; and will proof, process all data and conduct preliminary analysis.

Travel PWSSC \$2.0/yr (Yrs 1, 3, 4), \$4.0 Yr 2. 2 rt/year to Anchorage, once for the combined Alaska Marine Symposium and once to meet with Co-PI Kuletz at US Fish & Wildlife Service. Yr 4 January Alaska Marine Symposium meeting includes *PWS Herring Survey* PI meeting; Yr 2 includes a trip to a national ornithological meeting to present a paper.

Contractual costs for PWSSC include: Computer Network Costs (based on \$0.05/mo x staff mo) a direct cost; Phone/Fax/copy/mail/freight Charges (\$0.05/mo x staff mo), direct cost based on use only; Yr 2 statistician contract \$10.0

Commodities costs for PWSSC include: Ruggedized field computer \$3.0 in Yr 1
Field & Lab supplies Yr 1-3, \$1.5/yr; Yr 4 \$0.2. Includes software, log books, field notebooks,
office supplies, raingear, gps, recording equipment, fuel for Prince William Sound Science
Center truck.

Equipment for PWSSC no purchases; in-kind only

PWSSC will provide a Seabird 19-B Profiler that includes a Wetlab fluoremeter/turbidity sensor.

PWS Science Center Indirect Costs are estimated at 28% per year, pending approval by NOAA.

USFWS Commodities

Yrs 1 -4 \$1.0/yr

Includes IT supplies (backup disks, batteries, electronics, etc) for use during in-field data
collection and in-office data management and analysis. .

USFWS Equipment Yr 1 = \$0, Yr 2 = \$0, Yr 3 = 0, Yr 4 =0

In-kind equipment user fee (survival suits, electronics, binoculars, rangefinders, etc.) estimated at
\$10k. These are needed to conduct bird surveys on board research vessels, and the equipment
deteriorates from use in winter conditions.

**Note: all vessel charter costs for years 1-3 are included under the *PWS Herring Survey*.
*Community involvement, Outreach, Logistics & Synthesis***

Data Management and Quality Control Statement for Project Entitled:

PWS Herring Survey: Seasonal & Interannual Trends in Seabird Predation on Juvenile Herring

PI's: Dr. Kathy Kuletz (USFWS) & Dr. Mary Anne Bishop (PWSSC)

All the marine bird and mammal data collected in this study will be archived in the North Pacific Pelagic Seabird Database. We have abided by the Federal Government Data Committee standards for metadata and we have created our metadata form (see below).

Study Design and Statistical Analyses:

Survey methodology will follow established U.S. Fish and Wildlife Service protocols that have been adapted for GPS-integrated data entry programs (USFWS 2007). Our survey track lines will depend on the concurrent juvenile herring surveys. For the juvenile herring surveys an ~58' vessel follows a zig-zag survey track, 200m from shore or greater. One observer will record birds and mammals using a strip transect width of 300 m (150m both sides and ahead of the boat). Observations will be recorded into a GPS-integrated computer, which will provide location data for every record as well as sea conditions and weather. Observers will sample continuously and use binoculars to aid in species identification. Observers will practice estimating distances with a duck decoy, and laser rangefinders will be used regularly to calibrate observers. We will survey most transects when wave height is <30 cm, and we will not survey when wave height is >60 cm.

These surveys are not designed to provide population estimates; rather they will be used to calculate densities (birds / km²) of birds associated with juvenile herring (as determined by concurrent herring surveys).

The computer program (DLOG; Ford Consulting, Inc., Portland OR), will be prepared to simultaneously record foraging observations during the surveys. Foraging data will include observations of foraging activity of birds and mammals, including numbers and species of predators, behavior, and associated fish observations (visual, acoustic, or trawl-caught). While we have rarely observed seabirds bringing fish to the surface during winter, we will opportunistically visually identify any fish brought to the surface by birds using 10x42 binoculars. Fish will be visually identified to the lowest possible taxon, using study guides developed by USGS and USFWS.

Metadata Form:

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

Our data fit into your Taxonomic Sampling category. The fields associated with our data can be found in the list below:

Lat., Long, hour, minute, second, year, month, day, record number, type, distance, depth, species, number, behavior, transect, observer condition, weather, direction, wind, vessel, seas, observer name, glare conditions, comments (fish ID, etc) salinity, air temp, water temp.

All data will be used as it was collected, that is not reduced, although species numbers will be averaged for the individual transects and will analyzed as discussed earlier in this section.

Paradox or Access will be used with SAS to do analyses. Data Management and Quality Control Statement for Project Entitled:

IDENTIFICATION INFORMATION		HELP		ADDITIONAL SURVEY INFORMATION	
Abstract:	Surveys conducted under the OCSEAP program.			Survey Platform	Ship greater than 100 ft
Purpose:	Surveys conducted under the OCSEAP program.			Vessel Name	Surveyor
Supplemental Information:				General Area:	Western Gulf of Alaska + Bering Sea
				Local Area:	Kodiak to St. Matthew
				Data Type:	Discrete
				Minimum Unit of Measure	10 minute transect
				General Survey Effort	Four day survey in Western G.O.A. and Bering Sea.
				# of Transect	62
				# of Station Count	
				# of Observations:	62
				Frequency of Survey	unknown
DATA SET CREDIT INFORMATION					
Last Name	DeGange				
First Name	Anthony	M.I.	R.		
CONTACT INFORMATION (ADDRESS ETC.)					
Street 1:					
Street 2					
City:					
State/Province					
Zip/Postal Code:					
Phone:					
Email:					
Fax:					
SURVEY INFORMATION					
Trip ID	FW7042				
File Name	FNEW.145				
Publication Date (YYYY/MM/D)	1997/04/24				
Other Citation Details					
START DATE OF SURVEY (enter 9999, 99, 99 if unknown)					
Year (YYY)	1977	Month (MM)	06	Day (DD)	23
END DATE OF SURVEY (enter 9999, 99, 99 if unknown)					
Year (YYY)	1977	Month (MM)	06	Day (DD)	26
BOUNDING COORDINATES (in decimal degrees)					
North	58.18278	South	54.44167		
East	-152.10000	West	-169.35972		
OBSERVERS (if known)					
Last Name	Last Name				
1: DeGange	6				
2: SOWls	7				
3:	8				
4:	9				
5:	10				
CURRENT PRINCIPAL INVESTIGATOR INFORMATION					
Last Name	Piatt				
First Name	John	M.I.	F.		
Street 1	ABSC/USGS-BRD				
Street 2	1011 E. Tudor Rd.				
City	Anchorage				
State/Province	AK				
Zip/Postal Code	99503-				
Phone	907.786.3549				
Email	john_piatt@usgs.gov				
Fax	907.786.3636				
DATA USE RESTRICTION / CONTACT INFORMATION					
Restrictions	Unrestricted				
Last Name	Piatt				
First Name	John				
DATA QUALITY INFORMATION					
Positional Accuracy:					
Project Name	OCSEAP				
Reference					
Reference					
General Comments					

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Budget Category:	Proposed FY 10	Proposed FY 11	Proposed FY 12	Proposed FY 13	TOTAL PROPOSED	
Personnel	\$102.0	\$105.2	\$108.0	\$75.8	\$391.0	
Travel	\$4.0	\$6.0	\$4.0	\$4.0	\$18.0	
Contractual	\$1.0	\$11.0	\$1.0	\$0.4	\$13.4	
Commodities	\$5.5	\$2.5	\$2.5	\$1.2	\$11.7	
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
Indirect (<i>Contractor</i>)	\$22.5	\$25.7	\$22.9	\$13.0	\$84.1	
SUBTOTAL	\$135.0	\$150.4	\$138.4	\$94.4	\$518.2	
General Administration (9% of subtotal)	\$12.2	\$13.5	\$12.5	\$8.5	\$46.6	
PROJECT TOTAL	\$147.2	\$163.9	\$150.9	\$102.9	\$564.8	
Other Resources (Cost Share Funds)	\$35.0	\$35.0	\$35.0	\$10.0	\$115.0	

COMMENTS: This project is a component of *PWS Herring Survey* program. Shared vessel costs are in proposal by W.S. Pegau, *PWS Herring Survey: Community Involvement, Outreach, Logistics & Synthesis*

USFWS In-kind contributions:
 GS-12 for 1 mo) = \$10.0k;
 @ 250/d) = \$15k
 Equipment user fee (computers, survival suits, electronics, binoculars, rangefinders, etcd) = \$10.0k

Kathy Kuletz (
Boat user fee (60 d

FY10 - 13

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz Agency: DOI USFWS**

**FORM 3A
TRUSTEE &
CONTRACTOR
SUMMARY**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Budget Category:	Proposed FY 10	Proposed FY 11	Proposed FY 12	Proposed FY 13	TOTAL PROPOSED
Personnel	\$29.0	\$29.8	\$30.6	\$31.8	\$121.2
Travel	\$2.0	\$2.0	\$2.0	\$2.0	\$8.0
Contractual	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Commodities	\$1.0	\$1.0	\$1.0	\$1.0	\$4.0
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
SUBTOTAL	\$32.0	\$32.8	\$33.6	\$34.8	\$133.2
General Administration (9% of subtotal)	\$2.9	\$3.0	\$3.0	\$3.1	\$12.0
PROJECT TOTAL	\$34.9	\$35.8	\$36.6	\$37.9	\$145.2
Other Resources (Cost Share Funds)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

COMMENTS: This project is a component of *PWS Herring Survey* program. Shared vessel costs are in proposal by W.S. Pegau, *PWS Herring Survey: Community Involvement, Outreach, Logistics & Synthesis*

USFWS In-kind contributions:
 GS-12 for 1 mo) = \$10.0k;
 @ 250/d) = \$15k
 Equipment user fee (computers, survival suits, electronics, binoculars, rangefinders, etcd) = \$10.0k

Kathy Kuletz (
Boat user fee (60 d

FY10 - 13

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz Agency: DOI USFWS**

**FORM 3A
TRUSTEE AGENCY
SUMMARY**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Kuletz	Co-Principal Investigator	GS 12/7	2.0	10.0		20.0
Unknown	Biological Technician	GS 7/1	2.0	4.5		9.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			4.0	14.5	0.0	0.0
					Personnel Total	\$29.0

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Anchorage - Cordova	0.4	2	6	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2.0

FY10

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
PERSONNEL &
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs: Description	Contract Sum
Vessel Charter - is provided under the PWS Herring Survey Program (see proposal by W.S. Pegau)	
PWS Science Center (see Contractor spreadsheet)	
If a component of the project will be performed under contract, the 4A and 4B forms are required.	Contractual Total
	\$0.0

Commodities Costs: Description	Commodities Sum
IT supplies (backup disks, batteries, electronic support, etc)	1.0
	Commodities Total
	\$1.0

FY10

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
CONTRACTUAL &
COMMODITIES
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage: Description	Number of Units	Inventory Agency
USFWS Skiff w motor	1	FWS

FY10

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
EQUIPMENT
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Kuletz	Co-Principal Investigator	GS 12/7	2.0	10.3		20.6
Unknown	Biological Technician	GS 7/1	2.0	4.6		9.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			4.0	14.9	0.0	
					Personnel Total	\$29.8

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Anchorage to Cordova	0.4	2	6	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2.0

FY11

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
PERSONNEL &
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs: Description	Contract Sum
Vessel Charter - is provided under the PWS Herring Survey Program (see proposal by W.S. Pegau)	
Contract with PWS Science Center (see contractor spreadsheet)	
If a component of the project will be performed under contract, the 4A and 4B forms are required.	Contractual Total
	\$0.0

Commodities Costs: Description	Commodities Sum
IT supplies (backup disks, batteries, electronic support, etc)	1.0
	Commodities Total
	\$1.0

FY11

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
CONTRACTUAL &
COMMODITIES
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage:	Number of Units	Inventory Agency
Description		
USFWS Skiff w motor	1	FWS

FY11

Project Title: Seasonal and Interannual Trends in Seabird Predation on Juvenile Herring Lead PI: Kuletz
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FORM 3B EQUIPMENT DETAIL

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Kuletz	Co-Principal Investigator	GS 12/7	2.0	10.6		21.2
Unknown	Biological Technician	GS 7/1	2.0	4.7		9.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			4.0	15.3	0.0	0.0
					Personnel Total	\$30.6

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Anchorage to Cordova	0.4	2	6	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2.0

FY12

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
PERSONNEL &
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs: Description	Contract Sum
Vessel Charter - is provided under the PWS Herring Survey Program (see proposal by W.S. Pegau)	
Contract with PWS Science Center (see contractor spreadsheet)	
Contractual Total	\$0.0

Commodities Costs: Description	Commodities Sum
IT supplies (backup disks, batteries, electronic support, etc)	1.0
Commodities Total	\$1.0

FY12

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
CONTRACTUAL &
COMMODITIES
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage:	Number of Units	Inventory Agency
Description		
USFWS Skiff w motor	1	FWS

FY12

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
EQUIPMENT
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
 DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Kuletz	Co-Principal Investigator	GS 12/7	2.0	10.9		21.8
Unknown	Biological Technician	GS 7/1	2.0	5.0		10.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			4.0	15.9	0.0	21.8
					Personnel Total	\$31.8

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Anchorage to Cordova	0.4	2	6	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2.0

FY13

**Project Title: Seasonal and Interannual Trends in
 Seabird Predation on Juvenile Herring
 Lead PI: Kuletz**

**FORM 3B
 PERSONNEL &
 TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
 DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs: Description	Contract Sum
Contract with PWS Science Center (see contractor spreadsheet)	
If a component of the project will be performed under contract, the 4A and 4B forms are required.	Contractual Total
	\$0.0

Commodities Costs: Description	Commodities Sum
IT supplies (backup disks, batteries, electronic support, etc)	1.0
	Commodities Total
	\$1.0

FY13

**Project Title: Seasonal and Interannual Trends in
 Seabird Predation on Juvenile Herring
 Lead PI: Kuletz**

**FORM 3B
 CONTRACTUAL &
 COMMODITIES
 DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY13

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 3B
EQUIPMENT
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Budget Category:	Proposed FY 10	Proposed FY 11	Proposed FY 12	Proposed FY 13	TOTAL PROPOSED
Personnel	\$73.0	\$75.4	\$77.4	\$44.0	\$269.8
Travel	\$2.0	\$4.0	\$2.0	\$2.0	\$10.0
Contractual	\$1.0	\$11.0	\$1.0	\$0.4	\$13.4
Commodities	\$4.5	\$1.5	\$1.5	\$0.2	\$7.7
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Indirect (<i>will vary by proposer</i>)	\$ 22.5	\$25.7	\$22.9	\$13.0	\$84.1
SUBTOTAL	\$103.0	\$117.6	\$104.8	\$59.6	\$385.0
General Administration (9% of subtotal)	\$9.3	\$10.6	\$9.4	\$5.4	\$34.6
PROJECT TOTAL	\$112.3	\$128.1	\$114.2	\$65.0	\$419.6
Other Resources (Cost Share Funds)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

COMMENTS: This project is a component of *PWS Herring Survey* program. Shared vessel costs are in proposal by W.S. Pegau, *PWS Herring Survey: Community Involvement, Outreach, Logistics, & Synthesis*

FY10 - 13

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 4A
NON-TRUSTEE
AGENCY SUMMARY**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
 DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Mary Anne Bishop, Ph.D.	Co-Principal Investigator		4.0	10.0		40.0
Research Technician	Research Technician		6.0	5.5		33.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			10.0	15.5	0.0	Personnel Total
						\$73.0

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Cordova to Anchorage	0.4	2	6	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2.0

FY10

**Project Title: Seasonal and Interannual Trends in
 Seabird Predation on Juvenile Herring
 Lead PI: Kuletz**

**FORM 4B
 PERSONNEL &
 TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs:	Contract Sum
Description	
Vessel Charter - is provided under the PWS Herring Survey Program (see proposal by W.S. Pegau)	
network costs (based on \$50/mo x staff mo)	0.5
phone/fax/copying charges/mail/freight (\$50/mo x staff mo)	0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. Contractual Total	\$1.0

Commodities Costs:	Commodities Sum
Description	
field, office & lab supplies	1.5
ruggedized field computer	3.0
Commodities Total	\$4.5

FY10

Project Title: Seasonal and Interannual Trends in Seabird Predation on Juvenile Herring Lead PI: Kuletz
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FORM 4B CONTRACTUAL & COMMODITIES DETAIL

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Safety equipment - Prince William Sound Science Center (PWSSC)	1	
Desktop Computers and software (PWSSC)	2	
CTD w flouremeter & turbidity (PWSSC)	1	

FY10

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 4B
EQUIPMENT
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Mary Anne Bishop, Ph.D.	Co-Principal Investigator		4.0	10.3		41.2
Research Technician	Research Technician		6.0	5.7		34.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			10.0	16.0	0.0	
					Personnel Total	\$75.4

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Cordova to Anchorage	0.4	2	6	0.2	2.0
National Ornithological Meeting	1.2	1	5	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$4.0

FY11

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz:**

**FORM 4B
PERSONNEL &
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs: Description	Contract Sum
Vessel Charter - is provided under the PWS Herring Survey Program (see proposal by W.S. Pegau)	
network costs (based on \$50/mo x staff mo)	0.5
phone/fax/copying charges/mail/freight (\$50/mo x staff mo)	0.5
statistician	10.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	
Contractual Total	\$11.0

Commodities Costs: Description	Commodities Sum
lab, office & field supplies	1.5
Commodities Total	\$1.5

FY11

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 4B
CONTRACTUAL &
COMMODITIES
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
 DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Safety equipment - Prince William Sound Science Center (PWSSC)	1	
Desktop Computers and software (PWSSC)	2	
CTD w flouremeter & turbidity (PWSSC)	1	

FY11

**Project Title: Seasonal and Interannual Trends in
 Seabird Predation on Juvenile Herring
 Lead PI: Kuletz:**

**FORM 4B
 EQUIPMENT
 DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Mary Anne Bishop, Ph.D.	Co-Principal Investigator		4.0	10.5		42.0
Research Technician	Research Technician		6.0	5.9		35.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			10.0	16.4	0.0	
					Personnel Total	\$77.4

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Cordova to Anchorage	0.4	2	6	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2.0

FY12

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 4B
PERSONNEL &
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs:	Contract
Description	Sum
Vessel Charter - is provided under the PWS Herring Survey Program (see proposal by W.S. Pegau)	
network costs (based on \$50/mo x staff mo)	0.5
phone/fax/copying charges/mail/freight (\$50/mo x staff mo)	0.5
Contractual Total	\$1.0

Commodities Costs:	Commodities
Description	Sum
field, office & lab supplies	1.5
Commodities Total	\$1.5

FY12

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz:**

**FORM 4B
CONTRACTUAL &
COMMODITIES
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Safety equipment - Prince William Sound Science Center (PWSSC)	1	
Desktop Computers and software (PWSSC)	2	
CTD w flouremeter & turbidity (PWSSC)	1	

FY12

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 4B
EQUIPMENT
DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Personnel Sum
Name	Project Title					
Mary Anne Bishop, Ph.D.	Co-Principal Investigator		4.0	11.0		44.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
Subtotal			4.0	11.0	0.0	44.0
					Personnel Total	\$44.0

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Travel Sum
Description					
Cordova to Anchorage	0.4	2	6	0.2	2.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
Travel Total					\$2.0

FY13

**Project Title: Seasonal and Interannual Trends in
Seabird Predation on Juvenile Herring
Lead PI: Kuletz**

**FORM 4B
PERSONNEL &
TRAVEL DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
 DETAILED BUDGET FORM FY 10- FY 12**

Contractual Costs: Description	Contract Sum
network costs (based on \$50/mo x staff mo)	0.2
phone/fax/copying charges/mail/freight (\$50/mo x staff mo)	0.2
If a component of the project will be performed under contract, the 4A and 4B forms are required. Contractual Total	\$0.4

Commodities Costs: Description	Commodities Sum
office supplies, report preparation	0.2
Commodities Total	\$0.2

FY13

**Project Title: Seasonal and Interannual Trends in
 Seabird Predation on Juvenile Herring
 Lead PI: Kuletz**

**FORM 4B
 CONTRACTUAL &
 COMMODITIES
 DETAIL**

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 10- FY 12**

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

Existing Equipment Usage: Description	Number of Units	Inventory Agency
Desktop Computers and software (PWSSC)	1	

FY13

Project Title: Seasonal and Interannual Trends in Seabird Predation on Juvenile Herring Lead PI: Kuletz
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FORM 4B EQUIPMENT DETAIL
