EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

FINAL Work Plan

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FISCAL YEAR 2009

DRAFT WORK PLAN

October 15, 2010

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FY09 Proposal Funding Recommendations and Decisions

Project Number	Principal Investigator	Project Title (abbr.)	Total Requested	FY09 Approved	Total Approved	Science Coord.	Rest. Specialist	PAC	Executive Director	Trustee Council
090808	Ballachey	Nearshore Synthesis: Sea Otters and Sea Ducks	$105,700.00	$105,700.00	$105,700.00	Fund	Fund	Fund	Fund	**Fund**
090814	Bishop	Seabird Predation on Juvenile Herring	$211,000.00	$211,000.00	$211,000.00	Fund	Fund	Fund	Fund	**Fund**
090822	Bochenek	Herring Data and Information Portal	$77,800.00	$77,800.00	$77,800.00	Fund	Fund	Fund	Fund	**Fund**
070836-A	Boufadel	Bioremediation Technologies	$437,497.00	$437,500.00	$437,500.00	Do Not Fund	Fund	Not Reviewed	Not Reviewed	**Fund**
090100	EVOS Administration	EVOS Administration	$2,530,652.00	$2,530,652.00	$2,530,652.00	Not Reviewed	Not Reviewed	Not Reviewed	Fund	**Fund**
090817	Gay	Early Life History Stages of Pacific Herring	$55,100.00	$55,100.00	$55,100.00	Fund	Fund	Fund	Fund	**Fund**
090839	Hollmen	Evaluating Injury to Harlequin Ducks	$229,600.00	$229,600.00	$229,600.00	Fund	Fund	Fund	Fund	**Fund**
090751	Irons	Prince William Sound Marine Bird Surveys, Synthesis and Restoration	$312,200.00	$0.00	$0.00	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund	**Do Not Fund**
090811	Kline	Herring Forage Contingency	$249,700.00	$249,700.00	$249,700.00	Fund	Fund	Fund	Fund	**Fund**
090821	Linley	Culture Technology to Support Restoration of Herring	$43,200.00	$43,200.00	$43,200.00	Fund	Fund	Fund	Fund	**Fund**
090742	Matkin	Monitoring, Tagging, Feeding Studies, and Restoration of Killer Whales	$126,700.00	$198,500.00	$198,500.00	Fund	Fund	Fund	Fund	**Fund**
090841	Miles	CYP1A1 Gene Expression Verification Study	$204,734.50	$116,959.20	$116,959.20	Not Reviewed	Not Reviewed	Not Reviewed	Not Reviewed	**Fund**
090290	Nelson	The Exxon Valdez Trustee Council Hydrocarbon Database	$8,900.00	$8,938.00	$8,938.00	Fund	Fund	Fund	Fund	**Fund**
090804	Rice	Significance of Whale Predation	$366,500.00	$551,500.00	$551,500.00	Fund	Fund	Fund	Fund	**Fund**
090759	Rosenberg	Harlequin Duck Population Dynamics	$198,500.00	$198,500.00	$198,500.00	Fund	Fund	Fund	Fund	**Fund**
090806	Vollenweider	Are Herring Energetics a Limiting Factor	$206,400.00	$206,400.00	$206,400.00	Fund	Fund	Fund	Fund	**Fund**

Continuing Projects in FY09

Project #	Principal Investigator	Project Title (abbr.)	FY09 Funding	First Year Funded
070782	Bickford	Herring Restoration: Identifying Natal and Nursery Habitats	$77,700.00	FY07
070836	Boufadel	Factors Limiting the Degradation Rate of EVOS Oil	$266,600.00	FY07
070819	Hershberger	PWS Herring Disease Program	$258,600.00	FY07
070853	Irons	Pigeon Guillemot Restoration	$48,400.00	FY07
070810	Kiefer	Ecosystem Model of PWS Herring	$250,800.00	FY07
070830	Thorne	Trends in Adult and Juvenile Herring Distribution and Abundance in PWS	$226,800.00	FY07
070340	Weingartner	Alaska Coastal Current Monitoring	$129,500.00	FY07
070808-A	Ballachey	Nearshore Synthesis: Sea Otters and Sea Ducks	$279,000.00	FY08
080759-A	Rosenberg	Amendment to Harlequin Duck Population Dynamics	$176,700.00	FY08
080840	Venosa	Biodegradability of Lingering Oil	$354,238.00	FY08
FY09 Continuing Project Funding Total			**$2,068,338.00**	

Descriptions of New and Continuing Projects in FY09

Project Number: **070782**

Project Title: **Herring Restoration in PWS: Identifying Natal and Nursery Habitats**

Principal Investigator: Nate Bickford

Affiliation: University of Alaska Fairbanks

Co-PIs/Personnel: Brenda Norcross

Disbursing Agency: ADFG

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY07: $122,700.00	**FY08:** $134,600.00	**FY09:** $77,700.00
FY10: $0.00	**FY11:** $0.00	**FY12:** $0.00

Total Funding Approved: $335,000.00

Abstract:
More information is required to understand the life history of Pacific herring and thus success of future enhancement experiments designed to improve the survival rate of juveniles into adulthood. Chemical analysis of trace element concentrations in otoliths can be used to identify geographic signatures of natal habitats used by fishes captured either as juveniles or adults. Because survival of the population is dependent on successful spawning, it is imperative to understand if distinct groups of herring are contributing to the success of the population. If most of spawning success comes from a distinct groups of herring we need to know which population survived and why. This will allow us to protect the most important populations and also identify those environmental variables needed to enhance other populations. With the information gained from this project, we will be able to identify other habitats that may be suitable for herring recolonization projects.

Science Panel Comments:
Not Available

Science Panel Recommendation: Fund

Science Coordinator Comments:
This project will result in the identification of bays used as natal habitat by individual herring. Upon determining where fish are raised, specific characteristics of these bays can be measured. This will then help decide where enhancement activities such as larval or egg transport would best succeed. Reduce funding by the amount needed for meeting travel other than the annual EVOS meeting.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **070836**

Project Title: **Factors Responsible for Limiting the Degradation Rate of Exxon Valdez Oil in Prince William Sound Beaches-Submitted under the BAA**

Principal Investigator: Michel Boufadel

Affiliation: Temple University

Co-PIs/Personnel: Albert Venosa, Brian Wrenn

Disbursing Agency: NOAA

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY07: $434,800.00	**FY08:** $552,500.00	**FY09:** $266,600.00
FY10: $0.00	**FY11:** $0.00	**FY12:** $0.00

Total Funding Approved: $1,253,900.00

Abstract:

This proposal will provide important data for explaining the cause of the lingering oil in many of the Prince William Sound beaches affected by the 1989 Exxon Valdez oil spill. Because biodegradation of oil occurs at the oil-water interface, limitations occurring in the vicinity of that interface are hypothesized to be the primary reason for the lingering oil. In this study, we propose to investigate the two major sources of limitation: (1) environmental limitations, which involve nutrient concentrations (nitrogen, phosphorus, and dissolved oxygen) and their transport to the oil-water interface, and (2) the existence of an impenetrable layer or “skin” on the oiled sediment, which inhibits the bioavailability of oil. This often occurs when oil is stranded in the subsurface. The latter will be assessed by use of Scanning Electron Microscopic (SEM) examinations of oiled sediment. The effects of hydrodynamics will be assessed using tracer studies and 2-D or 3-D physics-based modeling of solute (i.e., nutrient) transport through the beach matrix. Hydrodynamics studies are important to understand the delivery (i.e., transport) of limiting nutrients to the oil-water interface. Extensive measurement of nutrient concentrations on PWS beaches will also be conducted to ascertain the extent of nutrient limitations on the biodegradation process. To our knowledge, this is the first rigorous study that addresses how the hydrodynamics of PWS beaches relate to the potential of bioremediation in relieving the aforementioned limitations. The proposed research will provide important inputs to an overall understanding of the transport and fate of oil in the PWS beaches and will provide guidance on how to accelerate the disappearance of the lingering oil present in the subsurface.

Science Panel Comments:

This proposal will examine and attempt to explain the cause of the lingering oil on PWS beaches. The proposal is well written and would give us information that is needed to determine why EVOS oil continues to linger in PWS. However, there is concern that the proposers have no experience working in the PWS environment and may need to adjust their methods as the project proceeds. We recommend that they proposal be funded for FY07 only at this time and reviewed in FY08 to determine the need for continuing funding.

Science Panel Recommendation: Fund Reduced

Science Coordinator Comments:

This project is technically sound and will provide answers related to the feasibility of implementing bioremediation activities in areas with lingering oil. The Science Panel and the Science Director raised several questions about the original proposal and asked the PIs to address them and provide revisions. Issues raised by the Science Panel

included, 1) Small sample size (only two beaches) and related concerns with geographic scale of inference and statistical power; 2) Lack of temporal replication (summer only sampling) and possible differences in measured variables among seasons; and 3) Evaluation of previous EVOS studies which may have provided similar information. The PIs were very responsive to the requests and produced a tighter, more focused proposal which will provide the information needed to determine if environmental conditions in areas with lingering oil will support a cost-effective bioremediation project. The Science Panel requested that the PIs provide a more robust study design and increase the number of sampling sites across several seasons. The changes that the PIs suggested, not surprisingly, increased the cost of the study.

The Science Panel recommended that one year of the study be funded, and future funding be reviewed in FY08. While I agree that the results of the FY07 field season should be evaluated and the study modified to incorporate results as they are learned, I don't agree with the Science Panel that only one year of funding should be provided. In order for the PIs to have a complete picture of the environmental conditions present in PWS, and data collected from enough sites to have a broad geographical scale of inference, the study should be funded in its entirety. If the Trustee Council is interested in pursuing bioremediation of areas with lingering oil as part of the restoration program, this project will provide information that will be necessary in determining whether bioremediation on a large-scale in PWS is feasible.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:

This proposal will provide an explanation of the cause of lingering oil and the feasibility of implementing bioremediation activities in areas with lingering oil. Because biodegradation of oil occurs at the oil-water interface, limitations occurring in the vicinity of that interface are hypothesized to be the primary reason for the lingering oil. However, I recommend only funding a one-year study with a much reduced scope that specifically addresses these limitations and whether bioremediation is a feasible alternative for removing lingering oil. If feasible, the Trustee Council can invite the PIs to submit a future proposal that builds on the findings of this proposal which integrates direct restoration.

Executive Director Recommendation: Fund Reduced

Trustee Council Comments:

Not Available

Trustee Council Decision: Fund

Project Number: **070819**

Project Title: **Prince William Sound Herring Disease Program**

Principal Investigator: Paul Hershberger

Affiliation: NOAA

Co-PIs/Personnel: Diane Elliott, Eveline Emmenegger, John Hansen, Richard Kocan, Gael Kurath, Scott Lapatra,

Disbursing Agency: USGS

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY07: $246,500.00	**FY08:** $257,100.00	**FY09:** $258,600.00
FY10: $272,800.00	**FY11:** $0.00	**FY12:** $0.00

Total Funding Approved: $1,035,000.00

Abstract:

A leading hypothesis accounting for the decline and failed recovery of the herring population in Prince William Sound involves epizootic mortality resulting from infectious and parasitic diseases. Ongoing and past surveillance of herring diseases in PWS, initiated by Dr. Gary Marty and continued by ADF&G through the herring disease index, is extremely valuable and necessary to document changes in disease prevalence, but field surveys are unable to unequivocally demonstrate epidemiological relationships that modulate disease cycles. This proposed multi-year Herring Disease Program (HDP) consists of three components intended to provide predictive metrics that forecast future disease epidemics and offer empirical relationships useful in developing adaptive management policies to mitigate the effects of epizootic and chronic diseases. The first component involves laboratory validation of the ongoing PWS herring disease index. Long-term continuation of the herring disease index, paired with laboratory validation, is necessary to confirm the efficacy of future adaptive disease management strategies. The second component involves empirical studies intended to determine the basic epidemiological relationships between environmental and biological factors influencing infection / disease prevalence. The final component involves development of immunological and molecular tools that will be useful in predicting the potential for future disease epidemics. Combined, this three-tiered approach will provide the basic epidemiological information necessary to develop and validate adaptive management techniques intended to mitigate the effects of future herring disease outbreaks in PWS.

Science Panel Comments:

Disease is an important consideration in the development of a comprehensive herring restoration program, and this is the only project that proposes to take an in-depth look at disease factors. The PIs are experts in the field and qualified to conduct the work. The panel recommends removing the immune gene expression objective, which is not well conceived or detailed in the proposal. Also, the PI should expedite the development of lab methods, so they can be used as tools to assess disease status in the field while captive work continues. A field component should also be added in Year 2 with concentration on Sitka (healthy stock) population for field validation.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Concur with the Science Panel. No other disease proposals were submitted to the Trustees, and disease plays an important role in the current state of PWS herring. However, disease is not fully understood in the PWS herring population. Understanding disease is vital to any direct intervention activity, so that the spread and expansion of disease problems can be prevented.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Concur with Science Panel.

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **070853**

Project Title: **Pigeon Guillemot Restoration Research in Prince William Sound**

Principal Investigator: David Irons

Affiliation: US Fish & Wildlife Service

Co-PIs/Personnel: Dan Roby

Disbursing Agency: USFWS

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY07: $317,000.00	**FY08:** $284,300.00	**FY09:** $48,400.00
FY10: $0.00	**FY11:** $0.00	**FY12:** $0.00

Total Funding Approved: $649,700.00

Abstract:

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

Science Panel Comments:

This proposal investigates the efficacy of direct restoration techniques for the pigeon guillemot population in PWS. They will genetically sample mink that reside on Naked Island Archipelago to determine if the population was introduced or native and make recommendations for a recovery plan for pigeon guillemots based on the findings. Pigeon guillemots are one of two non-recovered species and this project represents one of the few restoration based proposals that have been submitted. The genetic sampling of mink and studies examining the relative contribution of mink vs. other predators to pigeon guillemot survival and reproduction are important in evaluating mink removals as a potential restoration activity. However, there is some concern that removal of mink may not be an appropriate restoration activity if the mink are in fact native. Also, food limitation studies may be difficult to interpret with respect to restoration and are perhaps premature. Mink removal may still prove an effective restoration tool even if food quality is poor. Furthermore, given the likely annual variation in food supply, a lack of food in one year may not be a reasonable predictor of future food limitation. We recommend funding the initial year of this proposal and suggest that efforts be made to provide genetic evidence on mink at the end of that year so that reasoned decisions can be made regarding future funding

Science Panel Recommendation: Fund Reduced

Science Coordinator Comments:

The Science Director is on a long-term detail from the FWS and must therefore, recuse herself from making recommendations on FWS proposals. The PI on this proposal is employed by the FWS.

Science Coordinator Recommendation: Not Reviewed

Public Advisory Committee Comments:

Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:

Salaries and logistics are the major expenses of this proposal. Assuming mink predation on pigeon guillemots, any direct restoration will likely involve controlling the mink population on Naked Island. Before this can be undertaken a determination must be made whether the mink population is indigenous or introduced. Therefore, I only recommend funding the minimum mink capture and genetic testing program necessary to determine where the population is indigenous or introduced. I further recommend local trappers and logistics be utilized in this effort to reduce expense.

Executive Director Recommendation: Fund Reduced

Trustee Council Comments:

Not Available

Trustee Council Decision: Fund

Project Number: **070810**

Project Title: **An Ecosystem Model of Prince William Sound Herring: A Management & Restoration Tool**

Principal Investigator: Dale Kiefer

Affiliation: University of Southern California

Co-PIs/Personnel: Evelyn Brown, Frank O'Brien, Vardis Tsontos

Disbursing Agency: NOAA

Project Location: Analysis/Modeling of data from Prince William Sound & Gulf of Alaska

Project Type: Continuing

Funding Approved by Fiscal Year:

FY07:	$250,800.00	**FY08:**	$250,800.00	**FY09:**	$250,800.00
FY10:	$0.00	**FY11:**	$0.00	**FY12:**	$0.00

Total Funding Approved: $752,400.00

Abstract:

Over a three-year period, we propose to develop a life-stage specific, ecosystem based model of the Prince William Sound (PWS) herring that will aid in the integration of ecological data that has been gathered on herring over the last 2 decades, evaluation of proposed restoration activities, and attempt to simulation of the processes that cause the chronic decrease in herring stocks since the 1989 spill. More specifically, it will be used to test the unresolved hypotheses of why the herring have not recovered to pre-spill densities. The model and associated data will be housed in a geographic information system that we have developed specifically for marine applications. The geo-spatial information from field surveys and simulations with the model will available for interactive viewing and downloading of files over the Internet.

The model will provide a mathematical description of the population dynamics of annual herring cohorts as they mature through their life stages. In particular we will focus on arrival of larvae to the Bays of PWS, the maturation and survival of juveniles in these bays, and the survival and reproductive success of adults as they move seasonally from spawning grounds, feeding grounds and wintering grounds. The system of coupled differential equations that describe these processes will be tuned to prove a best fit between model calculations and field and laboratory measurements. In its final form the model will consist of 3 sets of such equations that will simulate the unique conditions found in herring habitats of the eastern, northern and southwestern regions of PWS. Most importantly, the model will be formulated according to the principals of the trophic trap in which 2 metastable states for herring exist, low-density and high-density. We propose that a sequence of events following the spill drove the herring from high-density to low-density and a trophic trap prevents stocks from recovering. Thus, we will tune our model to both high-density and low-density states and then run the tuned models in the forward or backward direction to identify both the most probable causes of the injury and the most promising approaches to restoration.

Our team has the scientific and technical experience to succeed, and we will work closely with researchers from the other herring projects, especially those working on larval drift, disease, otolith marking, and intervention. Our web-based system will promote such collaboration particularly with such groups as PWSFRAP and with the PWS Science Center.

Science Panel Comments:

This proposal is one of the most original and synthetic of the proposals reviewed. The predictive capability of the proposed model makes it a valuable tool for examining population dynamics of herring. This project could provide a central data gathering point for several of the other, more detailed, modeling proposals. The Panel suggests that the PIs accelerate the model development, such that it would be useable to assess efficacy of various potential restoration methods. The Panel was concerned that the model is inextricably linked with the patented EZ software system and

wants to ensure that the model could stand alone as a predictive tool.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Concur with Science Panel. The PI will need to work directly with the data management staff at the Trustee Council office to create a web-based product that is user-friendly and available to the public. The life-stage model will be useful in understanding how different stressors affect the PWS herring population, which until now has not been developed.

Data Systems Manager Comments: Defer: This project proposes to develop a comprehensive herring model for PWS based upon the previous work of Evelyn Brown and others. The PIs also propose to work with Vince Patrick to enhance the accuracy of the model by applying concepts learned at PWSFRAP when implementing the pink salmon model. They propose to house and run the model using the EASy GIS software system and to install this product on the EVOS server.

Though I am not a mathematical modeler, and thus cannot evaluate the proposal at that level, I do think that the conceptual modeling approach is responsive to the invitation and potentially valuable. However, I think this proposal may be a case of "too much too soon" for several reasons. First, a final report has not been received or peer reviewed for project 060784 (Adams FY06), which involved implementation of the pink salmon survival model. It would be good to evaluate the results of this project before embarking on a new modeling effort partially based upon it. Secondly, I like the idea proposed in the Moffitt proposal of building a centralized data portal for housing herring research data. I feel that first bringing together herring research data into a centralized electronic system will improve the availability of herring data and result in the building of better models and GIS systems. Thirdly, I recently met with Vardis Tsontos to install the GIS system software produced in project 040710. The product showed promise, but we encountered some technical problems with the software. These issues appeared to be due mostly to slight differences between the server configurations here at EVOS and the environment under which the software was developed. Thought I am confident the technical issues will be worked out (currently waiting on their database manager for a resolution), I would like to get the opinion of other scientists who might use the completed EASy GIS product as to its usefulness before we commit substantial resources towards development of additional products based upon it. The budget for this project is rather large, and I would also like to explore the question of GIS software standardization in the EVOS office before we commit to development of this system.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Do Not Fund

Executive Director Comments:

Fund but require the PIs accelerate model development as suggested by the Science Panel.

Executive Director Recommendation: Do Not Fund

Trustee Council Comments:

Not Available

Trustee Council Decision: Fund

Project Number: **070830**

Project Title: **Trends in Adult and Juvenile Herring Distribution and Abundance in Prince William Sound, submitted under the BAA**

Principal Investigator: Richard Thorne

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: None

Disbursing Agency: NOAA

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY07: $103,400.00	**FY08:** $103,400.00	**FY09:** $226,800.00
FY10: $0.00	**FY11:** $0.00	**FY12:** $0.00

Total Funding Approved: $433,600.00

Abstract:

Information on abundance, distribution and condition of key herring life stages is needed as a basis for restoration. Critical barometers of the PWS herring population are the adult abundance and condition, as monitored in March, and the juvenile abundance and condition going into and coming out of the long winter period (October to March). Some of this information is currently provided through a program at PWSSC that focuses on herring as a critical food source for Steller sea lions. We propose to fill data gaps in this program with juvenile herring surveys in March of 2007 and 2008 and three additional surveys in FY 2009. These surveys can be conducted in a very cost efficient manner because of the much larger concurrent program that will conduct two surveys each year in FY 2007 and 2008. In addition, the direct capture effort associated with all surveys will be expanded, and biological samples will be available for other uses including disease, marking and stable isotope research. Several collaborations have been established in this regard with investigators at the University of Alaska, Fairbanks, Auke Bay and PWSSC.

Science Panel Comments:

This proposal describes the “backbone” project for many of the other herring proposals submitted to the TC this year. It is a core field project for gaining information about abundance and distribution of herring in PWS, and other management and restoration activities will rely on this data. The project design yields a broader coverage of PWS, and because of matching funds the costs are reasonable. The PI is qualified and has many years of experience. This proposal received strong support from the Science Panel.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Concur with Science Panel. This is a keystone project that will provide status and trend data on herring (juvenile and adult) abundance and distribution throughout PWS across multiple seasons.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Concur with Science Panel.

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **070340**

Project Title: **Long-Term Oceanographic Monitoring of the Alaska Coastal Current**

Principal Investigator: Thomas Weingartner

Affiliation: University of Alaska Fairbanks

Co-PIs/Personnel: None

Disbursing Agency: ADFG

Project Location: Hydrographic Station GAK 1, Entrance to Resurrection Bay

Project Type: Continuing

Funding Approved by Fiscal Year:

FY07: $128,200.00	**FY08:** $131,300.00	**FY09:** $129,500.00
FY10: $0.00	**FY11:** $0.00	**FY12:** $0.00

Total Funding Approved: $389,000.00

Abstract:

This program continues a 36-year time series of temperature and salinity measurements at hydrographic station GAK 1. The data set, which began in 1970, now consists of monthly CTDs and a mooring with 6 temperature/conductivity recorders throughout the water column, a fluorometer and nitrate sensor at 20 m depth and a nitrate sensor at 150 m depth. The project monitors five important Alaska Coastal Current ecosystem parameters and to quantify and understand interannual and longer period variability in:

1. Temperature and salinity throughout the 250 m deep water column,
2. Near surface stratification,
3. Near and subsurface nitrate supply on the inner shelf,
4. Fluorescence as an index of phytoplankton biomass, and
5. Atmosphere-ocean heat fluxes.

In aggregate these variables are basic descriptors of the Alaska Coastal Current, an important habitat and migratory corridor for organisms inhabiting the northern Gulf of Alaska, including Prince William Sound.

Science Panel Comments:

This proposal, which is an extension of an existing TC funded project is well-written and clear in its design. The project measures physical/chemical data from one point in the Alaska Coastal Current that has been measured continuously for over 36 years. The ACC flushes PWS with water, thereby bringing nutrients and food into the system from the Gulf of Alaska. The project would provide basic, environmental measurements of constituents that affect all organisms inhabiting PWS including herring.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Concur with Science Panel.

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Concur with Science Panel.

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **070808-A**

Project Title: **Nearshore Synthesis: Sea Otters and Sea Ducks**

Principal Investigator: Brenda Ballachey

Affiliation: US Geological Survey

Co-PIs/Personnel: Jim Bodkin, Dan Esler, Keith Miles

Disbursing Agency: USGS

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY08: $485,300.00	**FY09:** $279,000.00	**FY10:** $0.00
FY11: $0.00	**FY12:** $0.00	**FY13:** $0.00

Total Funding Approved: $764,300.00

Abstract:

This is an amendment to Project 070808 (Sea Otter Recovery and Nearshore Synthesis). Sea otters, and other nearshore birds and mammals were severely impacted by the 1989 Exxon Valdez oil spill. In areas where acute effects were greatest and lingering oil persists, recovery for some of those nearshore birds and mammals remains incomplete through 2007. We present five objectives in this proposal: (1) Evaluate progress toward nearshore ecosystem recovery through surveys of expression of the Cytochrome P450 1A biomarker; (2) Estimate the frequency of use of oiled intertidal habitats by foraging sea otters; (3) Conduct histopathological examinations of sea otter liver biopsies; (4) Evaluate PCB concentrations in sea otters and sea ducks, and (5) Evaluate expression of an array of genes indicative of injury in sea ducks. Anticipated outcomes will identify the current level of exposure to lingering oil in a suite of nearshore vertebrates, potential pathways of exposure to lingering oil through intertidal foraging by sea otters, the potential contribution of non-EVO contaminants (PCBs) to expression of the P450 biomarker, and the potential for injury at the cellular level in sea otters and sea ducks.

Science Panel Comments:

This spatial synthesis of elevated biomarkers of multiple species will allow for the identification of areas of oil exposure which could be beneficial in prioritizing areas of lingering oil. However, Objective 5 is very unclear and we recommend that it be removed from the project's scope. We also highly recommend that this project work in coordination with Rosenberg (Harlequin Duck Population Dynamics) and Hollmen (Evaluating injury to harlequin ducks).

Science Panel Recommendation: Fund Contingent

Science Coordinator Comments:

Not Applicable

Science Coordinator Recommendation: Not Reviewed

Public Advisory Committee Comments:

Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:
Not Available

Executive Director Recommendation: Not Available

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **080759-A**

Project Title: **Amendment to Harlequin Duck Population Dynamics in Prince William Sound: Measuring Recovery from the Exxon Valdez Oil Spill**

Principal Investigator: Daniel Rosenberg

Affiliation: Alaska Department of Fish & Game

Co-PIs/Personnel: None

Disbursing Agency: ADFG

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY08: $40,600.00	**FY09:** $176,700.00	**FY10:** $0.00
FY11: $0.00	**FY12:** $0.00	**FY13:** $0.00

Total Funding Approved: $217,300.00

Abstract:

Since demographic studies were initiated, Cytochrome P450 1A induction studies have documented exposure to EVO at smaller spatial scales than population monitoring studies can measure. This biomarker of oil exposure has been correlated with lower female survival and is consistent with a lower proportion of females in oiled areas. However, broad scale demographic studies indicate population stability in oiled areas and not the decline expected if oil exposure reduces survival rates. This proposal attempts to improve the ability of demographic studies to assess data at smaller spatial scales commensurate with extant oil exposure, lingering oil, and oiling intensity. We will conduct Phase 1 of a Pilot Study to assess the range of variability on our transect counts by conducting replicate surveys of a random subsample of transects based on transect length and oiling history.

Science Panel Comments:

This amendment to Rosenberg's previously funded proposal (080759 - Harlequin Duck Population Dynamics in PWS: Measuring Recovery from the Exxon Valdez Oil Spill) will be helpful in reducing the spatial scales for data analysis that will improve the ability to detect changes in abundance and composition at smaller spatial scales. We would like to better understand the spatial scale proposed and request that the PI provide more clarity to the pilot study experimental design. We highly recommend that this project work in coordination with the Ballachey (Nearshore synthesis) and Hollmen (Evaluating injury to harlequin ducks).

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Applicable

Science Coordinator Recommendation: Not Reviewed

Public Advisory Committee Comments:

Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:
Not Available

Executive Director Recommendation: Not Available

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **080840**

Project Title: **Microcosm Study on the Biodegradability of Lingering Oil in Prince William Sound**

Principal Investigator: Albert Venosa

Affiliation: US Environmental Protection Agency

Co-PIs/Personnel: None

Disbursing Agency: USGS

Project Location: Prince William Sound

Project Type: Continuing

Funding Approved by Fiscal Year:

FY08: $181,735.00	**FY09:** $354,238.00	**FY10:** $0.00
FY11: $0.00	**FY12:** $0.00	**FY13:** $0.00

Total Funding Approved: $535,973.00

Abstract:

This proposal will provide important information that would help evaluate the persistence of the lingering oil in many of the Prince William Sound beaches affected by the 1989 Exxon Valdez oil spill. Because biodegradation of oil occurs at the oil-water interface, limitations occurring in the vicinity of that interface are hypothesized to be the primary reason for the lingering oil. The likely sources of limitation include: (1) environmental limitations (such as low nutrient concentrations and/or low oxygen) that would limit biodegradation, and (2) the lack of bioavailability of the oil due to its weathering or the existence of an impenetrable "skin" on the oiled sediment. This study proposes to investigate the biodegradability of the lingering oil collected from several sites still showing signs of oil in the subsurface. It will answer important questions about the biodegradability of the oil that has undergone weathering for 19 years. The laboratory study described in this proposal will provide evidence that could support decisions on whether to bioremediate the remaining oil contaminating the subsurface at selected sites in PWS. A complementary tracer study is currently ongoing in PWS to establish and understand the hydrodynamic properties of the PWS beaches that would allow the addition of nutrients, and possibly oxygen, for biostimulating the lingering oil. Results from both studies combined will provide sufficient support to aid the Exxon Valdez Oil Spill Trustee Council in making a decision regarding the propriety of undertaking an investigation of the applicability of bioremediation in the field.

Science Panel Comments:

While this proposal appears to be well thought out and will provide information on the potential for the biodegradation of lingering oil in PWS, it does raise several questions. The collection of substrate for the microcosm study will disrupt the oil/water barrier that may be hindering nutrients and oxygen from reach oil sequestered in the sediment. Without this barrier, the microcosm study may give far more optimistic results (as was acknowledged in the proposal) than would be possible in practical application. There also needs to be an in-depth study of the effects of the biodegraded oil, which can become more toxic and bioavailable after being exposed to oxygen and nutrients. Acute toxicity events could be likely if the effects of biodegradation are not well understood. Finally, the biodegradation of oil through the use of oxygen and nutrients has been well-documented in peer reviewed literature and pilot scale field work may better serve to understand the complex interactions of the biodegraded oil within its natural environment.

Science Panel Recommendation: Not Available

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Not Available

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Not Available

Executive Director Comments:
Not Available

Executive Director Recommendation: Not Available

Trustee Council Comments:
Resolution 08-12 approved in FY08. Project Mgt fees waived by NOAA.

Trustee Council Decision: Fund

Project Number: **090808**

Project Title: **Nearshore Synthesis: Sea Otters and Sea Ducks**

Principal Investigator: Brenda Ballachey

Affiliation: US Geological Survey

Co-PIs/Personnel: Jim Bodkin

Disbursing Agency: USGS

Project Location: Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $105,700.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $105,700.00

Abstract:
Sea otters, and other nearshore birds and mammals were severely impacted by the 1989 Exxon Valdez oil spill. In areas where acute effects were greatest and lingering oil persists longest, recovery for some of those nearshore birds and mammals remains incomplete through 2005. We present three objectives in this proposal: (1) Evaluate progress toward sea otter recovery through surveys of abundance and carcass deposition. (2) Evaluate factors contributing to the status of sea otter populations through the synthesis of long-term data sets on individual exposure to oil, health, condition, behavior, and home range in the context of long-term survival. (3) Conduct spatial synthesis of elevated biomarkers in mammals, birds, and fishes. Anticipated outcomes will identify shorelines where lingering oil most likely persists and which may be candidates for restoration or remediation.

Science Panel Comments:
This spatial synthesis of elevated biomarkers of multiple species will allow
for the identification of areas of oil exposure. We recommend continuing funding of this project.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090814**

Project Title: **Seabird Predation on Juvenile Herring in Prince William Sound**

Principal Investigator: Mary Anne Bishop

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: Kathy Kuletz

Disbursing Agency: USFWS

Project Location: Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $211,000.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $211,000.00

Abstract:
Based on population trends, the Prince William Sound (PWS) Pacific herring population does not show signs of recovering. Predation pressure on juvenile herring may be an important factor in preventing recovery. This proposal is for the final year of a largescale, three-year study to investigate seabird predation on juvenile herring during winter months (October-March), a season about which relatively little is known. Juvenile herring are heavily predated by multiple species of seabirds, including five species initially injured by the Exxon Valdez Oil spill, as well as Marbled Murrelet, Kittlitz's Murrelet and Pigeon Guillemot, three species that have not yet recovered. We will examine the spatial and temporal abundance of seabird predators in and around juvenile herring schools, as well as the physical and biological characteristics of the schools they feed on. Our project relies on seabird surveys being performed onboard vessels associated with EVOS projects 080830(hydroacoustic surveys for juvenile herring) and 080804 (humpback whale herring predation). Our bioenergetic models will provide estimates of juvenile herring consumption that will aid in planning future restoration efforts. Our data will also assess the role of seabird predation on herring recruitment by providing data to both herring and ecosystem modeling efforts.

Science Panel Comments:
This project is well integrated with good data on seabirds and herring. The most critical task of obtaining focal predator abundance and determining foraging rates will be completed in this final year.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090822**

Project Title: **Herring Data and Information Portal**

Principal Investigator: Robert Bochenek

Affiliation: Axiom Consulting & Design

Co-PIs/Personnel: None

Disbursing Agency: ADFG

Project Location: Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $77,800.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $77,800.00

Abstract:

This project will consolidate, document, and enter data sets, metadata, and other electronic resources into a web portal. The web portal will provide public access to information, data, and GIS visualizations. Scientist and researchers will utilize the web portal as a resource to assist in consolidating, accessing and synthesizing herring data. This project will also develop an ArcPad application for collecting herring aerial survey data directly into a GIS format. The project was conceived during an EVOS sponsored workshop in April 2006 that was tasked to identify Prince William Sound herring data gaps and develop restoration or research projects to help herring recovery. Participants indicated that knowledge of the spatial and temporal aspects of herring related data sets, e.g., herring spawn, lingering oil, and shore zone habitat was necessary to understand how restoration activities might affect herring abundance trajectories. Many herring related data sets that were are not easily accessible to restoration researchers and managers have been made available through the actions of this project in FY07 and FY08. This project will finish the work started in FY07 and FY08 and complete the process of data salvage for those data sets which were addressed in previous years. Several restoration options proposed at the Integrated Herring Restoration Program meetings will require spatial and temporal knowledge of herring related data as a tool for planning, input to a model or as a measure of the success of a restoration action. This project would provide easier access and visualization of selected herring data sets and other electronic resources.

Science Panel Comments:

The panel questioned whether the items being reported are actually matching the project's objectives. The project needs a high level of integration and can be a key tool in the integration effort. There is still a great deal of data that needs to be incorporated.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **070836-A**

Project Title: **Identifying and Evaluating Candidate Bioremediation Technologies**

Principal Investigator: Michel Boufadel

Affiliation: Temple University

Co-PIs/Personnel: None

Disbursing Agency: NOAA

Project Location: Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $437,500.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $437,500.00

Abstract:
This project amenedment will conduct additional field work extending the Limiting Factors study to determine if oxygen availability or nutrient availability (or both) in the lower beach layer are below concentrations necessary for the degradation of the lingering oil residues. This information is critical to the third phase of the Comprehensive Plan, that is, identifying and evaluating candidate bioremediation technologies. The proposed research will investigate factors that will inform whether inplace treatment of lingering oil by bioremediation is feasible, and if so, determine how to best stimulate this process through engineered manipulation of the physical or chemical environment of contaminated beaches. Using these results to understand the in-situ biodegradation of oil in the beaches of PWS presents some challenges, as the field conditions are different from those established in the lab. For this reason, we propose to conduct in-situ measurement of background levels of oxygen and nutrients in the summer of 2009.

In addition, we propose to test two alternative approaches to introducing oxygen and nutrients into the lower layer. These approaches will provide data on the hydraulic characteristics of the lower layer at the test beaches. These data will be important in evaluating and deploying pilot testing of candidate bioremediation technologies, should it be determined that the absence of oxygen and/or nutrients in this layer is a key factor in limiting oil biodegradation.

Science Panel Comments:
Not Available

Science Panel Recommendation: Do Not Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:
Not Applicable

Executive Director Recommendation: Not Reviewed

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090100**

Project Title: **EVOS Administration**

Principal Investigator: EVOS Administration

Affiliation: EVOSTC

Co-PIs/Personnel: None

Disbursing Agency: ADFG

Project Location: Trustee Council Office

Project Type: New

Funding Approved by Fiscal Year:

FY09:	$2,530,652.00	**FY10:**	$0.00	**FY11:**	$0.00
FY12:	$0.00	**FY13:**	$0.00	**FY14:**	$0.00

Total Funding Approved: $2,526,322.00

Abstract:

The budget structure has been utilized over the past three federal fiscal years is designed to provide a clearly identifiable allocation of the funds supporting Trustee Council activities. As
was specifically identified in the past two annual budgets, the program components are:

• Administration Management
• Data Management
• Science Management
• Public Information & Outreach
• Public Advisory Committee (PAC)
• Habitat Protection Program
• Trustee Council Member Direct Expenses
• Program Support/Project Management by Agencies
• Alaska Resources Library & Information Services

The budget estimates detailed within those specified program components are projected based upon prior year actual expenditures and include the application of estimated merit step increases,
as well as payroll benefits increases. Detailed budget component items are either “continuing” or “ongoing” from program directives already approved by the Trustee Council and cover necessary day-to-day operational costs of the Exxon Valdez Oil Spill Restoration Office and administrative costs associated with overseeing current Trustee Council program objectives. Program priorities include the development and implementation of the Integrated Herring Restoration Program (IHRP).

Although the FY09 Invitation requesting proposals has been deferred until the IHRP and a Human Services component have been developed and approved by the Council, the decision was made to provide projects that were funded only through FY08 an opportunity to request project extensions with requests for FY09 funding. Upon completion of the review process and the Trustee Council’s funding decisions, associated project management fees will be requested and reflected in an amendment to the FY09 APDI Budget. Some project management funds are included at this time to ensure Trustee Agencies have sufficient funds to manage on-going projects and to provide necessary compliance with the annual audit efforts.

Science Panel Comments:

Not Applicable

Science Panel Recommendation: Not Reviewed

Science Coordinator Comments:
Not Applicable

Science Coordinator Recommendation: Not Reviewed

Public Advisory Committee Comments:
Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090817**

Project Title: **Physical Oceanographic Processes in Relation to the Early Life History Stages of Pacific Herring (Clupea pallasi) in Prince William Sound Alaska**

Principal Investigator: Shelton Gay

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: None

Disbursing Agency: NOAA

Project Location: Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $55,100.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $55,100.00

Abstract:

Past research of juvenile Pacific herring in PWS has shown that recruitment is highly influenced by conditions within nursery sites affecting survival within the first year. Studies of the physical oceanography of nursery fjords has indicated that each site has a unique set of hydrographic conditions that are influenced by both local processes and water exchange between the GOA and PWS. These factors vary significantly depending on geographic location. The proposed study will build upon past research by continuing a hydrographic time series within nursery fjords and collect high resolution data on currents and hydrography to determine the dominant mechanisms of water exchange and circulation within two experimental fjords; one located in a highly productive sub-region (Simpson Bay) and one located in less productive sub-region influenced by tidewater glacial outflow (Whale Bay). Also, this project will provide a physical context for a suite of biological sampling proposed for these sites.

Science Panel Comments:

The panel has had the same concerns all along in that this is a good oceanography project being done on a small scale. However, the integration of the oceanography and the biology is unclear.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090839**

Project Title: **Evaluating Injury to Harlequin Ducks (Histrionicus histrionicus) Caused by Sublethal Hydrocarbon Exposure in Prince William Sound Using Species Specific Cell Lines**

Principal Investigator: Tuula Hollmen

Affiliation: Alaska SeaLife Center / University of Alaska Fairbanks

Co-PIs/Personnel: Kathrine Springman

Disbursing Agency: ADFG

Project Location: Prince William Sound, Alaska SeaLife Center (Seward)

Project Type: New

Funding Approved by Fiscal Year:

FY09: $229,600.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $229,600.00

Abstract:

Evaluation of harlequin duck (Histrionicus histrionicus) population trends, survival measures, and biomarker indicators of exposure suggests that the species is recovering, but has not fully recovered from the effects of the 1989 Exxon Valdez oil spill (EVOS) in the Prince William Sound (PWS). In areas oiled by the EVOS, elevated cytochrome P4501A biomarker induction has been observed in harlequin ducks as recently as March 2007, providing evidence of continued exposure. The magnitude of injury and its implications for populations of harlequin ducks caused by chronic oil exposure and long-term induction of central enzymatic processes is unknown. This study applies a panel of in vitro harlequin duck and surrogate cell line bioassays for a species-specific toxicological assessment of site-specific hydrocarbons from PWS. A combination of bioassays that measure direct effects on cell viability and DNA damage provide a new method to assess and quantify injury. Also, a battery of laboratory bioassays provides a method to link P4501A biomarker induction with other measures of cellular injury, and a comprehensive assessment of potential short and long-term toxicity.

Science Panel Comments:

The panel is very impressed with the progress and success of this work in such a short time frame and recommends continued funding.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090811**

Project Title: **Prince William Sound Herring Forage Contingency, submitted under the BAA**

Principal Investigator: Thomas Kline

Affiliation: Prince William Sound Science Center

Co-PIs/Personnel: None

Disbursing Agency: NOAA

Project Location: Prince William Sound and Adjacent Gulf of Alaska

Project Type: New

Funding Approved by Fiscal Year:

FY09: $249,700.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $249,700.00

Abstract:
Prince William Sound (PWS) herring recruitment is hypothesized to be contingent on young of the year herring attaining from zooplankton sufficient whole body energy content (WBEC) to survive their first winter. PWS recruitment is presently variable, having changed since the Trustee Council funded Sound Ecosystem Assessment (SEA) project ended. Juvenile herring will be sampled and analyzed for WBEC and natural stable isotope abundance (SIA) for comparison with SEA data. The PI has direct familiarity with WBEC and SIA done during SEA enabling duplication. Oceanic subsidies (detected with SIA) are hypothesized to augment zooplankton energy density, which varies in time and locations. High zooplankton energy density is hypothesized to enable herring to acquire high WBEC in certain areas at certain times. To test these hypotheses, herring forage will be assessed in terms species composition and density, SIA, and energy density, which will be related to herring WBEC by location and time.

Science Panel Comments:
The PI is generating new data and this project needs to move forward. There is some concern over the number of samples being taken and suggest that more tows may be necessary to determine density.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090821**

Project Title: **Development of Culture Technology to Support Restoration of Herring in Prince William Sound: Use of In Vitro Studies to Validate and Optimize Restoration Actions**

Principal Investigator: Timothy Linley

Affiliation: MariCal, Inc.

Co-PIs/Personnel: Marlies Betka, Howard Ferren

Disbursing Agency: ADFG

Project Location: Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $43,200.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $43,200.00

Abstract:

This project will supplement work accomplished with FY2008 funding that supported travel and collaboration with Japanese herring scientists, and investigation of factors affecting egg quality in herring. The supplemental budget will support the translation and synthesis of the Japanese technical manual on herring culture, and permit coordination with other EVOS TC principal investigators to coordinate the inclusion of stock supplementation objectives and activities into the herring restoration actions outlined within the Integrated Herring Restoration Plan (IHRP). Work products include the herring culture technical manual translation, synthesis of this document into a report that will provide a template for evaluating culture methods for use in PWS supplementation, and integration of the proposed methods with supporting science and herring management investigations and actions. The work will be accomplished in Seward and Anchorage, Alaska, and Portland, Maine

Science Panel Comments:

The translation of the Japanese manuals will assist with in the decision making process as the Integrated Herring Restoration Program writing continues.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090742**

Project Title: **Monitoring, Tagging, Feeding Studies, and Restoration of Killer Whales in Prince William Sound/Kenai Fjords in 2008**

Principal Investigator: Craig Matkin

Affiliation: North Gulf Oceanic Society

Co-PIs/Personnel: None

Disbursing Agency: NOAA

Project Location: Prince William Sound/Kenai Fjords

Project Type: New

Funding Approved by Fiscal Year:

FY09: $198,500.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $198,500.00

Abstract:

The proposed project is a continuation of the monitoring of AB pod and the AT1 population killer whale populations in Prince William Sound. These groups of whales suffered serious losses at the time of the spill and have not recovered at projected rates. This proposal seeks to extend the scope of the basic monitoring to include an innovative satellite tagging program to examine habitat preference and to aid in a more extensive examination of feeding habits using observational and chemical techniques. Results will allow us to more closely examine the potential for restoration. The project will more clearly delineate the role of killer whales in the nearshore ecosystem and possible effects on the restoration recovery of harbor seals and sea otters. Community based initiatives such as Youth Area Watch and educational programs for tour boat operators educational programs will continue to be integrated into the work to help foster restoration improving public understanding and reducing harassment of the whales.

Science Panel Comments:

This project is still generating very good data. We are learning a great deal by the apex predator status of the orcas and their interaction with the PWS ecosystem.

Science Panel Recommendation: Fund

Science Coordinator Comments:

Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:

Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090841**

Project Title: **CYP1A1 Gene Expression Verification Study – Re-Evaluation of Sea Otter Samples from the Exxon Valdez Oil Spill**

Principal Investigator: A. Miles

Affiliation: US Geological Survey

Co-PIs/Personnel: Brenda Ballachey

Disbursing Agency: USGS

Project Location: Western Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $116,959.20	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $116,959.20

Abstract:

Sea otter populations in western PWS were injured as a result of the Exxon Valdez oil spill, with evidence for both immediate acute mortality and longer term injury from chronic exposure to oil spilled in 1989. The EVOS Trustee Council funded over a decade of studies to identify progress toward recovery of the sea otter populations, particularly in the northern Knight Island Archipelago. These projects have addressed population demographics including abundance, habitat use, and survival rates, together with biological sampling to monitor body condition using blood parameters, liver pathology, and a CYP1A biomarker to determine oil exposure. Although population abundance data indicate some level of recovery in Prince William Sound overall, recovery remained incomplete as of 2006. Recently, a 2002 report (Snyder et al.) of the CYP1A biomarker assessments of sea otter exposure to oil has been questioned, making it necessary to reevaluate this method for assessing exposure. In this study, we propose to re-test the exposure of sea otters to lingering oil by applying our recent discoveries of sea otter specific genetic primers to measure gene expression on the archived samples from these projects. Our initial studies of mink experimentally exposed to oil identified genes that were significantly altered in expression (Bowen et al. 2007). These genes play a role in immuno-modulation, inflammation, cyto-protection, tumor suppression, reproduction, cellular stress-response, metal metabolism, xenobiotic metabolizing enzymes, antioxidant enzymes, and cell-cell adhesion. We have successfully sequenced 13 genes from sea otters that were expressed in mink experimentally exposed to oil, as well as 2 additional genes that aid interpretation of stress levels in animals exposed to xenobiotics that include aromatic hydrocarbons. In phase one of the project, we will analyze the gene expression of a suite of genes from archived Peripheral Blood Mononuclear Cells (PBMC) and liver samples collected from individual sea otters in 2003-2006. If these PBMC samples produce meaningful analytic results, the project will proceed with phase two, to analyze the gene expression in PBMC samples from 1996 through 2002. This study will allow us to verify our past understanding of oil exposure of sea otters in PWS, assess the current status of recovery, and provide a reliable method for assessing recovery in the future.

Science Panel Comments:

Not Applicable

Science Panel Recommendation: Not Reviewed

Science Coordinator Comments:

Not Applicable

Science Coordinator Recommendation: Not Reviewed

Public Advisory Committee Comments:
Not Applicable

Public Advisory Committee Recommendation: Not Reviewed

Executive Director Comments:
Not Applicable

Executive Director Recommendation: Not Reviewed

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090290**

Project Title: **The Exxon Valdez Trustee Council Hydrocarbon Database**

Principal Investigator: Bonita Nelson

Affiliation: NOAA

Co-PIs/Personnel: Mark Carls

Disbursing Agency: NOAA

Project Location: Auke Bay Laboratories – TSMRI, Juneau, AK

Project Type: New

Funding Approved by Fiscal Year:

FY09: $8,938.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $8,938.00

Abstract:
This project is an on-going service project providing data and sample archiving services for all samples collected for hydrocarbon analysis in support of Exxon Valdez Oil Spill Trustee Council projects.
These data represent samples collected since the oil spill in 1989 to the present and include environmental and laboratory Response (National Resource Damage Assessment-NRDA), Restoration and recovery projects data. This project serves as an archive for the chemistry analysis and sample data, physical samples that have not been analyzed, provides for copies of the ACCESS database for interested parties and responds to several FOIA requests for information associated with these data. Interpretative services for these data are available.

Science Panel Comments:
This is important work that we should continue funding.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090804**

Project Title: **Significance of Whale Predation on Natural Mortality Rate of Pacific Herring in PWS**

Principal Investigator: Stanley Rice

Affiliation: NOAA

Co-PIs/Personnel: Ron Heintz, John Moran, Terry Quinn, Jan Straley

Disbursing Agency: NOAA

Project Location: Prince William Sound, Sitka Sound, and Southern Lynn Canal

Project Type: New

Funding Approved by Fiscal Year:

FY09: $551,500.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $551,500.00

Abstract:
Pacific herring (Clupea pallasi) in Prince William Sound (PWS) have been classified as "not-recovered" by the Exxon Valdez Oil Spill Trustee Council. Predation by marine mammals has been cited as a factor in the failure of this population to rebound. We will assess the significance of humpback whale predation on herring in PWS, particularly in winter. Specifically we will estimate the number of whales foraging in winter, determine when and if there is a prey switch to herring, and how long whales focus on herring as prey. Year one was funded, small in scale with an intense monitoring strategy; year 2 would expand the scale up in area significantly. These data will be combined in a bioenergetic model to determine numbers of herring consumed (and energy content consumed). Lastly, the estimated numbers of herring consumed would be included in an age-structured model so that the significance of whale predation on herring recovery can be evaluated.

Science Panel Comments:
This Panel is very satisfied with the success of the first year of this project and recommends continued funding.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090759**

Project Title: **Harlequin Duck Population Dynamics in Prince William Sound: Measuring Recovery**

Principal Investigator: Daniel Rosenberg

Affiliation: Alaska Department of Fish & Game

Co-PIs/Personnel: None

Disbursing Agency: ADFG

Project Location: Prince William Sound

Project Type: New

Funding Approved by Fiscal Year:

FY09: $198,500.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $198,500.00

Abstract:
This project will monitor the recovery of harlequin ducks in PWS and is directly linked to recovery objectives in the EVOS Restoration Plan. The outlook for recovery is improving, however, oil remains in the intertidal, ducks are exposed to oil, populations in oiled areas while no longer declining have not increased more than those in unoiled areas, and proportions of females in oiled areas remain lower than reference areas. This suggests a lack of full recovery. We will conduct winter boat surveys to test if harlequin ducks have recovered from the EVOS by comparing population structure and trends between oiled and unoiled treatments in four areas (2 oiled, 2 unoiled) of PWS. Similar structure and increasing trends in oiled areas, when interpreted with complimentary data, will indicate recovery status. Work will be complimentary to studies addressing lingering oil, cytochrome P450 induction, and population modeling to provide a more comprehensive assessment of recovery.

Science Panel Comments:
The panel is looking forward to the analysis which will help describe some of the PI's comments regarding similar animal behavior between oiled and non-oiled sites.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund

Project Number: **090806**

Project Title: **Are Herring (Clupea Pallasi) Energetics in PWS a Limiting Factor in Successful Recruitment of Juveniles and Reproduction Investment of Adults?**

Principal Investigator: Johanna Vollenweider

Affiliation: NOAA

Co-PIs/Personnel: Ron Heintz

Disbursing Agency: NOAA

Project Location: Prince William Sound, Sitka Sound, Lynn Canal

Project Type: New

Funding Approved by Fiscal Year:

FY09: $206,400.00	**FY10:** $0.00	**FY11:** $0.00
FY12: $0.00	**FY13:** $0.00	**FY14:** $0.00

Total Funding Approved: $206,400.00

Abstract:

We propose to determine if the availability of energy is limiting production of PWS herring. In year 1 of the study, we made field collections of Pacific herring to examine two energetic mechanisms that could potentially inhibit herring recruitment in Prince William Sound (PWS). These were (1) overwinter mortality of juveniles, and (2) low reproductive energy investments by adults. These processes were compared among thriving (Sitka Sound) and depressed (Lynn Canal) herring stocks to calibrate PWS observations. Differences among stocks would suggest site-specific conditions that may translate into recruitment success. We propose extending these analyses over two more years to better estimate interannual variability. Collection costs can be decreased because of sampling efficiency with other projects. However, it is necessary to develop bioenergetic parameters for Pacific herring so energy consumption rates among herring from different locations can be directly compared. Energy consumption is a function of size, temperature and physiological condition. In order to compare the energy consumption rates of herring from different locations it is necessary to know how metabolic rates vary with respect to the temperatures in those locations. Therefore, we propose to supplement the field observations with a detailed bioenergetic analysis of YOY, juvenile and adult herring. The physiological parameters to be monitored (food intake, assimilation efficiency, growth, and resting metabolic rate), will be supplemented with 2 commonly used proxies for growth (RNA/DNA and enzyme analysis) to determine their suitability for measuring growth in the field. The additional data provided by the lab component will provide a secure foundation for weighing the evidence for or against energy limitations contributing to the population decline in PWS. Currently the data we seek are unavailable, however recent advances in culturing herring will allow us to make the necessary laboratory manipulations to obtain the data. While fulfilling our immediate needs for comparing herring populations, we anticipate that these data will be invaluable for future bioenergetic models describing herring growth, consumption, reproduction and response to disease. In year 3 (FY 2009) we propose to apply these data by examining the energetic cost of overwintering among healthy and disease challenged herring. This examination specifically tests the hypothesis that low levels of disease in PWS stocks are inhibiting recruitment. All of the herring culturing will be conducted at the USGS facility at Marrowstone Harbor, Washington, where herring capture, culture, and disease challenges are routine. The energetics measurements will be conducted over a range of temperatures, encapsulating the temperatures of Alaska, and will focus on three developmental stages of herring (age 0, age 1, and adults).

Science Panel Comments:

The panel feels that this work is important and that it is making great links between herring energetics and disease. Additionally, the observations between lab and field are indicating that some overwintering feeding is occurring.

Science Panel Recommendation: Fund

Science Coordinator Comments:
Not Available

Science Coordinator Recommendation: Fund

Public Advisory Committee Comments:
Not Available

Public Advisory Committee Recommendation: Fund

Executive Director Comments:
Not Available

Executive Director Recommendation: Fund

Trustee Council Comments:
Not Available

Trustee Council Decision: Fund