

**EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL**



**FINAL WORK PLAN**

Issued February 20, 2009



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# FISCAL YEAR 2008

## FINAL WORK PLAN

February 20, 2009

Prepared by:

*Exxon Valdez* Oil Spill Trustee Council

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## Notice

The abstract of each proposal was written by the author(s) of the proposal. Any opinions expressed in the abstracts do not necessarily represent the views of the Executive Director, the Science Director, or other staff of the *Exxon Valdez* Oil Spill Trustee Council, nor do they reflect policies or positions of the Trustee Council.

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Dear Reader:

Each year the *Exxon Valdez* Oil Spill Trustee Council (Trustee Council) funds activities to restore the resources and services injured by the 1989 *Exxon Valdez* Oil Spill. In 2007 the Trustee Council decided that the focus would remain on two critical restoration areas identified in 2006: lingering oil and herring. The Trustee Council continued to fund multi-year projects that were initiated in 2007 and carried forward many of the integrated Pacific herring research efforts. An invitation for proposals was not released in 2008.

In this Final Work Plan, the Trustee Council has endorsed a multitude of comprehensive projects ranging from the assessment and location of lingering oil; to effects of lingering oil on specific species; to integrated herring research and monitoring efforts. Herring have not recovered from the population crash of 1993, four years after the oil spill. Low numbers of herring continue to affect the ecosystem in Prince William Sound.

In the absence of an invitation for proposals for 2008, many of the herring projects initially funded in 2007 were extended for an additional year. Meetings held with herring researchers in the fall of 2007 and the spring of 2008 demonstrated that the initial results of the herring research showed promising results, and the research was promoting an integrated approach to herring data collection. Four meetings with herring researchers, fishing community members, and Trustee Council staff were conducted over the summer of 2008 and resulted in a draft Integrated Herring Research Program (IHRP). The IHRP contains alternatives for restoration and objectives that will inform future invitations for proposals.

Research into the location, magnitude, and effects of lingering oil in Prince William Sound is ongoing. Projects identified in 2007 continued into 2008 with the approval and funding of four additional projects mid-year 2008. The fact that oil persists in a variety of forms and is toxic to some species in much smaller amounts than thought has furthered scientific knowledge and helped shape future research needs.

This Work Plan contains information and funding recommendations for projects that supplied detailed project updates in the absence of a 2008 invitation for proposals.

Sincerely,



Elise Hsieh  
Interim Executive Director



Jennifer Schorr  
Interim Deputy Executive Director

## **Acknowledgements**

We would like to express our appreciation to Trustee Council staff members (former and current) Carrie Holba, Cherri Womac, Catherine Boerner, Barbara Hannah, Debbie Hennigh, JoEllen Lottsfeldt, Mandy Migura, Michael Schlei, and Shane StClair, whose hard work and dedication made this Final Work Plan possible. Special thanks to the anonymous scientists who peer reviewed the proposals and thanks also to the principal investigators and their collaborators for giving us so many fine proposals with which to continue building our program. Many thanks to those scientists from Trustee Council agencies that provided help, and we extend our special thanks to Dede Bohn, Carol Fries, Pete Hagen, Tom Brookover, Jenifer Kohout, and Steve Zemke. We also owe thanks to the members of the Science Panel (Steve Braund, Ron O'Dor, Gary Cherr, Tom Dean, Robert Spies, and Charles (Pete) Peterson) for their expert program guidance and peer review efforts.

Elise Hsieh, Interim Executive Director  
Jennifer Schorr, Interim Deputy Executive Director

## **Overview of the FY08 Work Plan**

The Final FY08 Work Plan comprises both multi-year projects submitted in previous years that have received continuous funding by the Trustee Council, as well as project amendments received in response to the Trustee Council's request for amendments from FY07 funded researchers. The Draft Work Plan allows the Trustee Council to review the projects proposed for fiscal year 2008 and the funding requested to implement the proposed work. This Final Work Plan contains basic information about an individual amendment and its complete record of funding recommendations during the review process.

The Trustee Council has an open, competitive contracting process that is designed to allow proposals from any source to be considered for funding as an external project. The system works well for this purpose as demonstrated by the fairly even distribution of funding across the home institutions of the principal investigators of external projects.

## Continuing Projects in FY08

Project #	Principal Investigator	Project Title (abbr.)	FY08 Funding	First Year Funded
070808	Ballachey	Sea Otter Recovery and Nearshore Synthesis	\$97,700.00	FY07
070782	Bickford	Herring Restoration: Identifying Natal and Nursery Habitats	\$134,600.00	FY07
070836	Boufadel	Factors Limiting the Degradation Rate of EVOS Oil	\$552,500.00	FY07
070816	Esler	Evaluating Harlequin Duck Population Recovery	\$23,900.00	FY07
070819	Hershberger	PWS Herring Disease Program	\$257,100.00	FY07
070853	Irons	Pigeon Guillemot Restoration	\$284,300.00	FY07
070810	Kiefer	Ecosystem Model of PWS Herring	\$250,800.00	FY07
070805	Lindeberg	ShoreZone Mapping for PWS	\$322,300.00	FY07
070801	Michel	Assessment of Lingering Oil in PWS & GOA	\$128,600.00	FY07
070830	Thorne	Trends in Adult and Juvenile Herring Distribution and Abundance in PWS	\$103,400.00	FY07
070340	Weingartner	Alaska Coastal Current Monitoring	\$131,300.00	FY07
<b>FY08 Continuing Project Funding Total</b>			<b>\$2,286,500.00</b>	

# FY08 Proposal Funding Recommendations and Decisions

Project Number	Principal Investigator	Project Title (abbr.)	Total Requested	FY08 Approved	Total Approved	Science Panel	Rest. Specialist	PAC	Executive Director	Trustee Council
070808-A	Ballachey	Nearshore Synthesis: Sea Otters and Sea Ducks	\$764,300.00	\$485,300.00	\$485,300.00	Fund Contingent	Not Reviewed	Not Reviewed	Not Available	Fund
080624	Batten	Acquisition of Continuous Plankton Recorder Data	\$141,200.00	\$0.00	\$0.00	Fund	Do Not Fund	Do Not Fund	Fund	Do Not Fund
080814	Bishop	Seabird Predation on Juvenile Herring in PWS	\$412,200.00	\$204,300.00	\$204,300.00	Fund	Fund	Fund	Fund	Fund
080100	EVOS Administration	EVOS Administration	\$2,063,269.00	\$2,355,269.00	\$2,355,269.00	Not Reviewed	Not Reviewed	Not Reviewed	Not Reviewed	Fund
080630-A	EVOS Administration	NOS Grant Funding	\$89,040.00	\$89,040.00	\$89,040.00	Not Reviewed	Not Reviewed	Not Reviewed	Not Reviewed	Fund
080817	Gay	Factors Affecting Productivity in Juvenile Pacific Herring Nursery Habitats	\$96,400.00	\$70,100.00	\$70,100.00	Fund	Fund	Fund	Fund	Fund
080837	Gifford	Kodiak ADFG Building	\$6,540,000.00	\$0.00	\$0.00	Not Reviewed	Not Reviewed	Do Not Fund	Do Not Fund	Not Reviewed
080839	Hollmen	Evaluating Injury to Harlequin Ducks	\$148,600.00	\$148,600.00	\$148,600.00	Fund	Not Reviewed	Not Reviewed	Not Available	Fund
070853-A	Irons	Pigeon Guillemot Restoration	\$570,800.00	\$0.00	\$0.00	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund
080751	Irons	PWS Marine Bird Surveys, Synthesis and Restoration	\$36,000.00	\$36,000.00	\$36,000.00	Fund	Fund	Fund	Do Not Fund	Fund
080800	Joyce	Cordova Center	\$7,464,070.00	TBD	TBD	Not Reviewed	Not Reviewed	Do Not Fund	Do Not Fund	Fund Contingent
080811	Kline	PWS Herring Forage Contingency	\$521,000.00	\$353,700.00	\$353,700.00	Fund	Fund	Fund	Fund	Fund
080821	Linley	Culture Technology to Support Restoration of Herring in PWS	\$87,900.00	\$87,900.00	\$87,900.00	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund	Fund
080742	Matkin	Killer Whales in PWS/Kenai Fjords	\$129,600.00	\$129,600.00	\$129,600.00	Fund	Fund	Fund	Fund Contingent	Fund
080834	Meuret-Woody	Identification of Essential Habitat for Pacific Herring	\$23,500.00	\$23,500.00	\$23,500.00	Fund	Fund	Fund	Fund	Fund
080822	Moffitt	Herring Data and Information Portal	\$204,000.00	\$204,000.00	\$204,000.00	Fund	Do Not Fund	Do Not Fund	Do Not Fund	Fund Contingent
080290	Nelson	Hydrocarbon Database	\$11,100.00	\$11,100.00	\$11,100.00	Fund	Fund	Fund	Fund Contingent	Fund
080804	Rice	Significance of Whale Predation	\$327,800.00	\$327,800.00	\$327,800.00	Fund	Fund	Do Not Fund	Fund Contingent	Fund Contingent
080759	Rosenberg	Harlequin Duck Population Dynamics in PWS	\$117,400.00	\$117,400.00	\$117,400.00	Fund	Fund	Do Not Fund	Do Not Fund	Fund
080759-A	Rosenberg	Amendment to Harlequin Duck Population Dynamics	\$40,600.00	\$40,600.00	\$40,600.00	Fund	Not Reviewed	Not Reviewed	Not Available	Fund
080829	Shigenaka	Bioavailability and Effects of Lingering Oil to Littleneck Clams	\$417,400.00	\$0.00	\$0.00	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund	Do Not Fund



<b>Project Number</b>	<b>Principal Investigator</b>	<b>Project Title (abbr.)</b>	<b>Total Requested</b>	<b>FY08 Approved</b>	<b>Total Approved</b>	<b>Science Panel</b>	<b>Rest. Specialist</b>	<b>PAC</b>	<b>Executive Director</b>	<b>Trustee Council</b>
080840	Venosa	Biodegradability of Lingering Oil	\$535,973.00	\$181,735.00	\$535,973.00	Not Available	Not Available	Not Available	Not Available	<b>Fund</b>
080806	Vollenweider	Are Herring Energetics a Limiting Factor	\$187,300.00	\$187,300.00	\$187,300.00	Fund	Fund	Fund	Fund	<b>Fund</b>
<b>Total Funds Requested and Approved</b>			<b>\$20,929,452.00</b>	<b>\$5,053,244.00</b>	<b>\$5,407,482.00</b>					

**Total Number of Proposals Received in FY08: 24**

**Total Number of New Projects Funded in FY08: 20**

## New Projects in FY08

Project Number	Principal Investigator	Project Title (abbr.)	FY08 Funding	FY09 Funding	FY10 Funding	FY11 Funding	FY12 Funding	FY13 Funding
070808-A	Ballachey	Nearshore Synthesis: Sea Otters and Sea Ducks	\$485,300.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080814	Bishop	Seabird Predation on Juvenile Herring in PWS	\$204,300.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080100	EVOS Administration	EVOS Administration	\$2,355,269.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080630-A	EVOS Administration	NOS Grant Funding	\$89,040.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080817	Gay	Factors Affecting Productivity in Juvenile Pacific Herring Nursery Habitats	\$70,100.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080839	Hollmen	Evaluating Injury to Harlequin Ducks	\$148,600.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080751	Irons	PWS Marine Bird Surveys, Synthesis and Restoration	\$36,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080800	Joyce	Cordova Center	TBD	TBD	TBD	TBD	TBD	TBD
080811	Kline	PWS Herring Forage Contingency	\$353,700.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080821	Linley	Culture Technology to Support Restoration of Herring in PWS	\$87,900.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080742	Matkin	Killer Whales in PWS/Kenai Fjords	\$129,600.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080834	Meuret-Woody	Identification of Essential Habitat for Pacific Herring	\$23,500.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080822	Moffitt	Herring Data and Information Portal	\$204,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080290	Nelson	Hydrocarbon Database	\$11,100.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080804	Rice	Significance of Whale Predation	\$327,800.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080759	Rosenberg	Harlequin Duck Population Dynamics in PWS	\$117,400.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080759-A	Rosenberg	Amendment to Harlequin Duck Population Dynamics	\$40,600.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
080840	Venosa	Biodegradability of Lingering Oil	\$181,735.00	\$354,238.00	\$0.00	\$0.00	\$0.00	\$0.00
080806	Vollenweider	Are Herring Energetics a Limiting Factor	\$187,300.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Project Number	Principal Investigator	Project Title (abbr.)	FY08 Funding	FY09 Funding	FY10 Funding	FY11 Funding	FY12 Funding	FY13 Funding
FY08 New Project Funding Totals			\$5,053,244.00	\$354,238.00	\$0.00	\$0.00	\$0.00	\$0.00

Total Approved Funding for Continuing Projects in FY08: \$2,286,500.00

Total Approved Funding for New Projects in FY08: \$5,053,244.00

Total Approved Funding in FY08: \$7,339,744.00

# Descriptions of New and Continuing Projects in FY08

**Project Number:** 070808  
**Project Title:** Sea Otter Recovery and Nearshore Synthesis  
**Principal Investigator:** Brenda Ballachey  
**Affiliation:** DOI  
**Co-PIs/Personnel:** Jim Bodkin  
**Disbursing Agency:** USGS  
**Project Location:** Prince William Sound  
**Project Type:** Continuing

## Funding Approved by Fiscal Year:

<b>FY07:</b> \$154,000.00	<b>FY08:</b> \$97,700.00	<b>FY09:</b> \$0.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00

**Total Funding Approved:** \$251,700.00

## 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:

The proposed project will extend long-term data sets on the population abundance and survival that are critical to the continued evaluation of injury and recovery of sea otters. In addition, the project will provide important syntheses of past data on population dynamics of sea otters and exposure of sea otters and other injured nearshore resources to oil. These syntheses will allow further assessment of the relative importance of continued oil exposure to sea otter recovery, provide information that will help in evaluation of the efficacy of potential restoration activities, and help to guide decisions regarding locations where clean up of oiled shorelines might be considered. The panel recognizes the excellent publication record of the Principal Investigators, but urges them to publish results of biomarker work that has yet to be fully addressed in peer reviewed publications.

**Science Panel Recommendation:** Fund

## Restoration Specialist Comments:

Objectives in the Study: 1) Evaluate sea otter population dynamics through carcass recovery and surveys 2) Integrate existing data to evaluate constraints to otter recovery 3) Identify areas where otters are exposed to oil and overlap with other injured resources still being exposed to oil. This proposal is directly responsive to the 07 Invitation. The modeling component will address the question regarding the temporal need for sea otter recovery. It will address how the spatial overlap of animals with elevated CYPIA are related. It's cost effective.

Concur with Science Panel. It is necessary to continue the carcass surveys in order to determine age-specific mortality which can be used in a population model. To be useful this information needs to be collected every year. The spatial synthesis of elevated biomarkers in a suite of nearshore species may allow them to identify 'hot spots' of oil exposure which could be beneficial in prioritizing areas of lingering oil.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

Concur with Science Panel and Science Director comments and recommend funding.

**Executive Director Recommendation:** Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 070782  
**Project Title:** Herring Restoration in PWS: Identifying Natal and Nursery Habitats  
**Principal Investigator:** Nate Bickford  
**Affiliation:** Alaskan University  
**Co-PIs/Personnel:** Brenda Norcross  
**Disbursing Agency:** ADFG  
**Project Location:** Prince William Sound  
**Project Type:** Continuing

**Funding Approved by Fiscal Year:**

<b>FY07:</b> \$122,700.00	<b>FY08:</b> \$134,600.00	<b>FY09:</b> \$77,700.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$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

**Restoration Specialist 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.

**Restoration Specialist 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:** Non AK University  
**Co-PIs/Personnel:** Albert Venosa, Brian Wrenn  
**Disbursing Agency:** NOAA  
**Project Location:** Prince William Sound  
**Project Type:** Continuing

**Funding Approved by Fiscal Year:**

<b>FY07:</b> \$434,800.00	<b>FY08:</b> \$552,500.00	<b>FY09:</b> \$266,600.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$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

**Restoration Specialist 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.

**Restoration Specialist 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:** 070816  
**Project Title:** Evaluating Harlequin Duck Population Recovery: CYP1A Monitoring and a Demographic Population Model  
**Principal Investigator:** Daniel Esler  
**Affiliation:** Non AK University  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** USGS  
**Project Location:** Prince William Sound  
**Project Type:** Continuing

**Funding Approved by Fiscal Year:**

<b>FY07:</b> \$177,800.00	<b>FY08:</b> \$23,900.00	<b>FY09:</b> \$0.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00

**Total Funding Approved:** \$201,700.00

**Abstract:**

Harlequin ducks are one of the few species defined as “not recovered” from the 1989 Exxon Valdez oil spill. In this document, we propose 2 areas of inquiry to (1) evaluate the status of population recovery, specifically the degree of exposure to lingering oil, and (2) more fully understand the demographic processes underlying population recovery, through application of a quantitative population model.

Cytochrome P4501A (CYP1A) has proven to be an extremely useful tool for documenting the spatial and temporal degree of exposure to lingering oil, and there is a large body of historical CYP1A data (1998 to 2005) for harlequin ducks. The most recent data from March 2005 irrefutably demonstrated that harlequin ducks continued to be exposed to lingering oil. Because population recovery requires cessation of exposure to oil, we propose to resample harlequin ducks from throughout the oiled area of Prince William Sound, along with nearby unoiled areas, to determine whether they continue to be exposed to lingering oil.

A considerable volume of demographic data on harlequin ducks has been collected during research and monitoring efforts since the spill. We propose to assemble these data in a population model, which will be valuable for: (1) identifying the timing and magnitude of oil spill injury, (2) identifying the mechanisms by which injury occurred and population recovery was constrained, (3) evaluating the current status of recovery, including predictions for timing of full recovery, and (4) recommending future restoration activities.

**Science Panel Comments:**

The proposed project will extend long-term data sets on potential exposure of Harlequin ducks to oil that is critical to the continued evaluation of injury and recovery of harlequin ducks. In addition, the project will provide important syntheses of past data on population dynamics of harlequin ducks. These syntheses will allow further assessment of the relative importance of continued oil exposure to harlequin recovery and provide information that will help in evaluation of the efficacy of potential restoration activities.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

This proposal will tie together years of harlequin duck data from the spill area that prior to now has not been synthesized in such a way that leads to a comprehensive understanding of harlequin population dynamics that have

occurred as a result of the spill. This project will provide a predictive tool for understanding initial population impacts of the spill and possible population recovery scenarios.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

Concur with Science Panel and Science Directors comments and recommend funding.

**Executive Director Recommendation:** Fund

**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:** DOI

**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:**

<b>FY07:</b> \$246,500.00	<b>FY08:</b> \$257,100.00	<b>FY09:</b> \$258,600.00
<b>FY10:</b> \$272,800.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$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

**Restoration Specialist 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.

**Restoration Specialist 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:** DOI  
**Co-PIs/Personnel:** Dan Roby  
**Disbursing Agency:** USGS  
**Project Location:** Prince William Sound  
**Project Type:** Continuing

**Funding Approved by Fiscal Year:**

<b>FY07:</b> \$317,000.00	<b>FY08:</b> \$284,300.00	<b>FY09:</b> \$48,400.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$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

**Restoration Specialist 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.

**Restoration Specialist 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:** Non AK University

**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:**

<b>FY07:</b> \$250,800.00	<b>FY08:</b> \$250,800.00	<b>FY09:</b> \$250,800.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$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

**Restoration Specialist 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. Though 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.

**Restoration Specialist 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:** 070805  
**Project Title:** ShoreZone Mapping for Prince William Sound  
**Principal Investigator:** Mandy Lindeberg  
**Affiliation:** NOAA  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** NOAA  
**Project Location:** Prince William Sound  
**Project Type:** Continuing

**Funding Approved by Fiscal Year:**

<b>FY07:</b> \$237,900.00	<b>FY08:</b> \$322,300.00	<b>FY09:</b> \$0.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00

**Total Funding Approved:** \$560,200.00

**Abstract:**

This proposal will continue ShoreZone mapping in Prince William Sound (PWS), Alaska. Approximately 8,400 km of shoreline has been mapped in the central Gulf of Alaska, including 1,600 km of shoreline in western PWS in 2004. The majority of the spill area inside PWS, including Knight island area and all of northern and eastern PWS have not been mapped. To support both future oil remediation efforts as well as restoration activities, such as possible herring intervention programs like moving spawn to rearing areas, would be supported by a single mapping protocol that included geomorphology, substrate type, as well as the biological substrate on all beaches. Completing PWS would fill the gap by providing a contiguous data set from across the entire spill area using a standard protocol. Most importantly, this data set will be useful to managers, as it combines photographs of the entire beach area, as well as having a data set that can be sorted by location, substrate type, and other factors. The ShoreZone data set is recognized as a significant tool for oil spill response planning, identifying essential fish and wildlife habitat, and for monitoring long-term changes in coastal habitat that may result from development, restoration, or even global climate change. Three 6-day aerial video imagery surveys (about 4,000 km of shoreline), mapping, ground-truthing, and nearshore fish sampling are proposed. Aerial video imagery would be completed in the first summer, mapping in the following winter, with ground truthing/fish sampling at a limited selection of sites the following summer.

**Science Panel Comments:**

This proposal provides Sound-wide data on important physical and biological characteristics of the environment that would be applicable to herring restoration, as well as lingering oil issues and injured resource recovery. The Panel did not see the value in the fish sampling effort and suggested its removal, along with a reduction in the amount of ground-truthing proposed. A great deal of information is already known about the PWS, and the field effort should be enough to validate the aerial surveys. However, it is not necessary to cover such a large proportion of the area. The cost seemed high, but with a reduction in the field effort this project should be more cost effective.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Concur with Science Panel. The information derived from this project will be applicable to most injured resources and services, especially those reliant on the nearshore environment. The fish collections should be removed, the number of ground-truthing events reduced and costs trimmed accordingly.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

Not Available

**Executive Director Recommendation:** Fund Contingent

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 070801  
**Project Title:** Assessment of the Areal Distribution and Amount of Lingering Oil in Prince William Sound and the Gulf of Alaska  
**Principal Investigator:** Jacqueline Michel  
**Affiliation:** Private Enterprise  
**Co-PIs/Personnel:** Gail Irvine, Jeff Short  
**Disbursing Agency:** NOAA  
**Project Location:** Prince William Sound and the Gulf of Alaska (Kenai Peninsula and Kodiak Strait)  
**Project Type:** Continuing

**Funding Approved by Fiscal Year:**

<b>FY07:</b> \$1,465,500.00	<b>FY08:</b> \$128,600.00	<b>FY09:</b> \$0.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00

**Total Funding Approved:** \$1,594,100.00

**Abstract:**

The proposed study is to develop and implement a statistically rigorous field study and spatial modeling analysis to produce maps showing the probability of lingering oil in areas of Prince William Sound and the Gulf of Alaska that were affected by the Exxon Valdez oil spill. We will also estimate the area and volume of oiled sediments in these areas as of 2007. Sediment samples will be analyzed to fingerprint the source of the oil residues, characterize them as to the degree of weathering and risk to exposed biota, and determine treatability using bioremediation. The results will provide key data for use in developing more detailed remediation plans and priority areas for remediation. The probability maps will allow researchers to identify locations where oil persists with much greater precision, leading to more sensitive studies of the long-term effects of the lingering oil on biota in the spill-impact regions.

**Science Panel Comments:**

The study will provide information critical to restoration, is well designed, and is to be conducted by qualified investigators with a strong track record at a reasonable cost. The panel recommends that the work be funded. The panel did have some questions regarding the qualifications of persons responsible for the modeling and statistical analyses. These should be explicitly identified and a resume provided for Dr. Pella who it appears will play a key role with respect to these aspects of the project. Also, it is unclear as to if or how the extent of oil on armored beaches will be evaluated. As described, the methods described do not appear applicable to sampling in these potentially important habitats. If necessary, the design should be modified to incorporate these.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

The location, distribution and amount of lingering oil remaining in the spill area are key questions that may influence all future activities related to the restoration program. The PIs have excellent qualifications and the expertise to conduct this project.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

In comparing of this proposal with the PI's FY05 Trustee Council funded project, the stated overhead rate has increased from 120% to 170%; and this proposal also includes a 6% profit. In the FY05 project, the requested overhead was 15%, with a 120% in-kind contribution from Research Planning, Inc--this is not offered in this proposal. While I believe this proposal is scientifically sound and would provide valuable information for Trustee Council deliberations, funding should be contingent on the PI providing a current copy of the indirect rate reference in Research Planning, Inc current accounting practices and the inconsistencies referenced above are addressed.

**Executive Director Recommendation:** Fund Contingent

**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:** NGO  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** NOAA  
**Project Location:** Prince William Sound  
**Project Type:** Continuing

**Funding Approved by Fiscal Year:**

<b>FY07:</b> \$103,400.00	<b>FY08:</b> \$103,400.00	<b>FY09:</b> \$226,800.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$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

**Restoration Specialist 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.

**Restoration Specialist 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:** Alaskan University  
**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:**

<b>FY07:</b> \$128,200.00	<b>FY08:</b> \$131,300.00	<b>FY09:</b> \$129,500.00
<b>FY10:</b> \$0.00	<b>FY11:</b> \$0.00	<b>FY12:</b> \$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

**Restoration Specialist Comments:**

Concur with Science Panel.

**Restoration Specialist 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:** USGS  
**Co-PIs/Personnel:** Jim Bodkin, Dan Esler, Keith Miles  
**Disbursing Agency:** USGS  
**Project Location:** Prince William Sound  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$485,300.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$485,300.00

**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

**Restoration Specialist Comments:**

Not Applicable

**Restoration Specialist 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:** 080814  
**Project Title:** Seabird Predation on Juvenile Herring in Prince William Sound  
**Principal Investigator:** Mary Anne Bishop  
**Affiliation:** NGO  
**Co-PIs/Personnel:** Kathy Kuletz  
**Disbursing Agency:** USGS  
**Project Location:** PWS & NE PWS (Sheep Bay, Simpson Bay, Port Gravina)  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$204,300.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$204,300.00

**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. Here we propose a large-scale, 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 preyed upon by multiple species of seabirds including five species injured by the Exxon Valdez Oil Spill, one recovering species, and one recovered species. 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 three other projects (2 proposed EVOS studies, 1 PWSSC study) conducting hydroacoustic surveys for juvenile herring schools. Our estimates of juvenile herring consumption will aid in planning future restoration efforts as well as in assessing the role of seabird predation on herring recruitment by providing data to both herring and ecosystem modeling efforts.

**Science Panel Comments:**

This proposal fills an important gap in our knowledge of herring predators and their impacts on herring populations. Therefore, the proposal is being recommended for funding.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

While there are several PI's conducting seabird studies in PWS, this project is the only one that links predation pressure of seabirds to the continuing decline of herring.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

I agree with the comments of the Science Panel and Science Director and the recommendation of the PAC.

**Executive Director Recommendation:** Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 080100  
**Project Title:** Annual Program Development and Implementation  
**Principal Investigator:** EVOS Administration  
**Affiliation:** Not Available  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** ADFG  
**Project Location:** Trustee Council Office & Trustee Agencies  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$2,355,269.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$2,355,269.00

**Abstract:**

Federal Fiscal Year 2008 marks the third year of the Annual Program Development & Implementation Budget formally adopted by the Trustee Council. The revised budget structure that has been utilized over the past two federal fiscal years has provided a more 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
- Community Involvement
- Public Advisory Committee (PAC)
- Small Parcel Program
- Trustee Council Member Direct Expenses
- Program Support/Project Management by Agencies
- Alaska Resource 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 an estimated 3.1% consumer price index increase and an approximate 4% increase in personnel costs to cover budgeted 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 completion of the Herring Restoration Plan and continuance of the Herring Recovery efforts.

The focus of FY 08 is to continue with efforts initiated in FY 06 and FY 07 until the Science Program activity results are reviewed and a determination is made providing guidance for future program priorities. Although a FY 08 Invitation requesting proposals for the forthcoming federal fiscal year was not offered during Federal Fiscal Year 2007, a decision was made to provide projects that were only approved funding for FY 07 an opportunity to request project extensions with requests for FY 08 funding. Upon completion of the peer review processes and the Trustee Council’s funding decisions, associated project management fees will be requested and allocated at that time. To ensure continuance of Trustee Council support, Trustee Agency Liaison salary allocations have been equally budgeted within the Program Support component and are being requested to cover these services for the entire federal fiscal year. A minimal allotment of Project Management funds is also being requested to ensure Trustee Agencies have sufficient funds to manage FY 07 project close-outs and to provide necessary compliance with the annual audit efforts.

The Trustee Council Restoration Office is administratively located within the Alaska Department of Fish and Game and over the past two federal fiscal years has significantly advanced towards being a self-supportive administrative office. The office is structurally organized with one or two professional staff overseeing each of the program component activities identified within this budget request and operates efficiently and effectively when fully staffed as a nine-member team.

**Science Panel Comments:**

Not Applicable

**Science Panel Recommendation:** Not Reviewed

**Restoration Specialist Comments:**

Not Applicable

**Restoration Specialist 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:** 080630-A  
**Project Title:** NOS Grant Funding  
**Principal Investigator:** EVOS Administration  
**Affiliation:** Not Available  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** ADFG  
**Project Location:** Trustee Council Office  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$89,040.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$89,040.00

**Abstract:**

Not Available

**Science Panel Comments:**

Not Applicable

**Science Panel Recommendation:** Not Reviewed

**Restoration Specialist Comments:**

Not Applicable

**Restoration Specialist 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:** 080817  
**Project Title:** Physical Oceanographic Factors Affecting Productivity in Juvenile Pacific Herring Nursery Habitats, submitted under the BAA  
**Principal Investigator:** Shelton Gay  
**Affiliation:** NGO  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** NOAA  
**Project Location:** Prince William Sound  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$70,100.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$70,100.00

**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:**

This project is the only one continuing to make key hydrographic and circulation measurements in PWS. Such measurements are critical to other studies, like that of Kline, and to constructing a synthetic population model for herring.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

This project has already provided critical information that will be utilized by herring researchers on the physical oceanographic changes that are occurring in herring nursery bays. This project is comprehensive in scope in that it is replicating and building on a previous SEA study examining physical oceanographic factors in four environmentally distinct nursery bays in PWS, and is incorporating past and present data. The PI is also examining ocean current flows leading to advection/retention of zooplankton and herring larva in nursery bays to help understand the productivity of nursery bays.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

I agree with the comments provided by the Science Panel and Science Director and the recommendation of the PAC.

**Executive Director Recommendation:** Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 080839

**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

**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:**

<b>FY08:</b> \$148,600.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$148,600.00

**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:**

This is an innovative project that will help ground the CYP1A response to real oil exposure with site specific sampling. The information gathered from this work will be beneficial for use in other species. 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

**Restoration Specialist Comments:**

Not Applicable

**Restoration Specialist 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:** 080751  
**Project Title:** Prince William Sound Marine Bird Surveys, Synthesis and Restoration  
**Principal Investigator:** David Irons  
**Affiliation:** DOI  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** USGS  
**Project Location:** Prince William Sound, Alaska  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$36,000.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$36,000.00

**Abstract:**

We propose to write a report for the survey that was conducted to monitor abundance of marine birds in Prince William Sound, Alaska during March and July 2007. Eight previous surveys have monitored population trends for >65 bird and 8 marine mammal species in Prince William Sound after the Exxon Valdez oil spill. We will use data collected in 2007 to examine trends from summer and from winter to determine whether populations in the oiled zone are increasing, decreasing, or stable. We will also examine overall population trends for the Sound. Continued monitoring of marine birds and synthesis of the data are needed to determine whether populations injured by the spill are recovering. Data collected from 1989 to 2005 in the oiled area indicated that bald eagles (*Haliaeetus leucocephalus*), common loons (*Gavia immer*), and cormorants (*Phalacrocorax* spp) are increasing in winter. Numbers of all other injured species are either not changing or are declining in the oiled area. Populations of harlequin ducks (*Histrionicus histrionicus*), black oystercatchers (*Haematopus bachmani*) and common murrelets (*Uria aalga*) are showing no trend in the oiled area; pigeon guillemots (*Cepphus columba*), marbled murrelets (*Brachyramphus marmoratus*), and Kittlitz's murrelets (*Brachyramphus brevirostris*) are declining in the oiled areas of Prince William Sound. Results of all surveys have been summarized in reports and results through 1998 have been published by Irons et al. (2000) and Lance et al. (2001). Analyses and synthesis of these survey data are the only ongoing means to evaluate the recovery of most of these injured species. Please note: The cost of report writing was not included in the original proposal because I was told that in FY 2007 the Trustees wanted only a one year proposal and the report cannot be written in the same year as the surveys because of timing of the surveys.

**Science Panel Comments:**

This request for funding is only for report writing for marine bird surveys conducted as part of this PI's FY07 funding.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Concur with Science Panel

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

In the budget justification for Project 070751/Irons - Prince William Sound Marine Bird Surveys, Synthesis and Restoration, the PI references requesting funding for a final report. The PI is aware of the final report requirements and to request appropriate funding when submitting the original proposal. This also sets a bad precedent that other PIs may choose to follow.

**Executive Director Recommendation:** Do Not Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 080800  
**Project Title:** EVOSTC Outreach and Information Sharing Venue - Cordova Center  
**Principal Investigator:** Timothy Joyce  
**Affiliation:** Local Government  
**Co-PIs/Personnel:** Cathy Sherman  
**Disbursing Agency:** To Be Determined  
**Project Location:** Cordova  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> To Be Determined	<b>FY09:</b> To Be Determined	<b>FY10:</b> To Be Determined
<b>FY11:</b> To Be Determined	<b>FY12:</b> To Be Determined	<b>FY13:</b> To Be Determined

**Total Funding Approved:** To Be Determined

**Abstract:**

The Cordova Center will be a 34,000 sq. ft. ADA accessible multiuse facility designed to address EVOSTC, community and regional needs for: public outreach, EVOSTC research and information sharing; symposia; museum oil spill history and new response technology exhibit; library research support; visitor center; oil spill response center; science discovery room; restoration effort results; and art representing ecosystems of the Delta and Sound.

**Science Panel Comments:**

Not Applicable

**Science Panel Recommendation:** Not Reviewed

**Restoration Specialist Comments:**

Not Applicable

**Restoration Specialist Recommendation:** Not Reviewed

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Do Not Fund

**Executive Director Comments:**

Generally, the library services described in this proposal duplicate existing services available at ARLIS and the Trustee Council website. The schedule for fund-raising and the bid process seems ambitious, with construction to begin 14 to 17 months from Council funding. The history of the Alaska SeaLife Center has shown the importance of researching the anticipated annual operating costs of a facility and how they will be paid. Also, as stated in the supporting EIS for the SeaLife Center, no Joint Trust Funds were involved in the construction and maintenance of the public education and visitation component of that project.

This proposal states “the Center will function as a repository [library] for data generated by EVOS projects that will make this information readily available to...” ARLIS has served this function since 1997. ARLIS houses the most comprehensive collection of its kind. ARLIS also acquires oil spill related materials from other sources to meet the information needs of EVOS researchers. In addition to the Trustee Council, the ARLIS partnership includes six state and federal resources agencies and an institute of UAA, all with mandates to provide information to the public. This partnership maximizes budget funds. ARLIS also borrows 15,000 documents each year from other research libraries for its researchers, many of whom are EVOS funded. Interlibrary loans costs, including copyright fees and postage, are built into the budget. Expanding the Cordova collection to meet the needs of researchers would require considerable funding, staff time, and space.

This proposal states the Center will “present educational programs for all ages regarding research results; provide online links and access to EVOS Trustee Council related educational materials and share resources for research needs of Prince William Sound Science Center, Native Village of Eyak, and Prince William Sound Community College.” Full-text EVOS TC publications are web available at the EVOS TC website and the ARLIS catalog. The PWSSC and OSRI are currently ARLIS partners, receiving desktop access to databases and electronic journals. EVOS related materials and other ARLIS research materials are also available to everyone in Alaska via interlibrary loan from their local library.

This proposal still contains a reference to archival materials, which will remain at the Alaska State Archives by statutory mandate.

**Executive Director Recommendation:** Do Not Fund

**Trustee Council Comments:**

Funded contingent on the following:

1. That a portion of the facility be used, as described in the January 2007 proposal, to educate the public and build scientific knowledge relating to the impacts of the 1989 Exxon Valdez Oil Spill and restoration of those impacts and further restoration goals.
2. That the city provide, before any expenditure of EVOS funds, documentation demonstrating to the satisfaction of the Alaska Department of Law and NOAA that the city has firm commitments for the funding of all the anticipated costs of construction of the Cordova Center, and that the Cordova Center will be used for EVOS related purposes as described in the January 19, 2007 proposal.
3. That the city provide a written commitment that the city will fund all operation and maintenance costs of the Cordova Center and not request operation and maintenance funds from the EVOS Trustee Council.

**Trustee Council Decision:** Fund Contingent



**Project Number:** 080811  
**Project Title:** Prince William Sound Herring Forage Contingency, Submitted Under the BAA  
**Principal Investigator:** Thomas Kline  
**Affiliation:** NGO  
**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:**

<b>FY08:</b> \$353,700.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$353,700.00

**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 of species composition and density, SIA, and energy density, which will be related to herring WBEC by location and time.

**Science Panel Comments:**

Strong recruitment of juvenile herring is required for healthy viable herring populations, and it is important for young of the year fish to acquire enough energy to survive their first winter. The relationship between herring food resources (e.g., species, source, abundance etc) and body condition can be used to understand herring survival which will ultimately influence the regulation of population densities.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Concur with Science Panel.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

I agree with the comments provided by the Science Panel and the recommendation of the PAC.

**Executive Director Recommendation:** Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 080821  
**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:** Private Enterprise  
**Co-PIs/Personnel:** Marlies Betka, Nate Bickford, Evelyn Brown, Caroline Cherry, Steven Craig, Brandon Delbos,  
**Disbursing Agency:** ADFG  
**Project Location:** Prince William Sound  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$87,900.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$87,900.00

**Abstract:**

This proposal is specifically designed to maintain our previously established collaboration with the Japanese herring researchers and foster their further involvement to address critical questions regarding factors that may be limiting recovery of herring in Prince William Sound. Please note that the two Objectives we have proposed are focused on scientific topics that were encompassed by our original proposal and thus should not require any additional scientific or technical review.

Objective 1: Plan and coordinate travel for Dr. Takahiro Matsubara and an associate or designee to travel to Alaska to attend the Marine Science Symposium in January 2008, participate in an EVOS Trustee Council sponsored workshop on herring stock restoration, visit the fish culture facilities at the ASLC, the Seward Shellfish Hatchery and USGS Marrowstone Field Lab (Nordland, WA), tour potential stock restoration rearing and release sites in PWS (e.g. Tatitlik), and meet with scientists and interested parties involved in the Prince William Sound herring restoration effort.

Objective 2: Conduct an assessment (survey) of yolk proteins and products in female herring that affect gamete quality and potential larval recruitment during the spawning cycle in PWS during 2008

**Science Panel Comments:**

The Panel was disappointed that the PI's visit to Japan to study herring culture techniques in FY07 was so brief. While the project is scientifically sound, enhancement is still under consideration as a potential restoration tool for herring in PWS. This project should be reviewed next fiscal year in relation to the Herring Recovery Plan, which will be in place.

**Science Panel Recommendation:** Do Not Fund

**Restoration Specialist Comments:**

I concur with the Science Panel.

**Restoration Specialist Recommendation:** Do Not Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Do Not Fund

**Executive Director Comments:**

When receiving FY07 funding, the PIs were directed to collaborate with the Japanese on herring culture techniques and to remove the calcium receptor gene objective because it is unclear how that relates to herring. They were also requested to consider a larger range of environmental factors in their culture methods and analyze their effects on growth and survival. The PIs also needed to define a source for their captive fish, describe how they will consider the role of disease in their work and resolve permitting issues. The PIs spent a total of 4 days in Japan and also chose to work on the calcium receptor gene objective. I recommended not funding their FY07 proposal because the work on the PWS Herring Restoration Plan was not complete. Before the Council considers funding this amendment, I continue to recommend waiting for the Herring Restoration Plan to guide their decisions.

**Executive Director Recommendation:** Do Not Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 080742  
**Project Title:** Monitoring, Tagging, Feeding Studies, and Restoration of Killer Whales in Prince William Sound/Kenai Fjords in 2007  
**Principal Investigator:** Craig Matkin  
**Affiliation:** NGO  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** NOAA  
**Project Location:** Prince William Sound/Kenai Fjords  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$129,600.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$129,600.00

**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:**

The proposal asks for additional funds to employ additional satellite tags on killer whales. The panel recommends that more emphasis be placed on tagging the AB pod, which is currently listed on the Injured Resources and Services list as "recovering".

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Currently, tracking whales over large areas and understanding where and how they spend the majority of their time is measured by how frequently the investigators encounter whales and how long they are able to watch them. The proposed technique would allow the principal investigator to remotely track whales throughout their home range, which includes a much bigger area than can be reasonably covered by small boat. As part of their FY08 work, I would expect to have at least one tag on the AB pod, which is the injured resident population.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

I recommend FY08 funding; however, prior to releasing funds the PI must receive my approval on the following conditions:

- Explain why no AB pod and only one AT1 population killer whales were tagged this past summer.
- Explain the methodology to ensure AB pod and the AT1 population killer whales will be tagged in FY08.

**Executive Director Recommendation:** Fund Contingent

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 080834  
**Project Title:** Identification of Essential Habitat for Pacific Herring (*Clupea Pallasii*) in Sitka Sound for Comparison to Prince William Sound i.e. Source vs. Sink Habitat– Submitted under the BAA  
**Principal Investigator:** Heather Meuret-Woody  
**Affiliation:** NGO  
**Co-PIs/Personnel:** Nate Bickford  
**Disbursing Agency:** ADFG  
**Project Location:** Sitka Sound, Sitka Alaska, Southeast Alaska  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$23,500.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$23,500.00

**Abstract:**

Once herring hatch and the larvae drift to retention areas, they begin metamorphosis. As juveniles, herring forage in productive waters of the North Pacific. Adult herring then return to natal beaches to spawn. What is unknown is where the herring go and if certain regions contribute more to the spawning population. Once we know which population contributes more to the spawning groups, we can then identify those variables that enhance the life histories of the source population. We can identify these groups and track their movements using otolith chemistry. The adult herring that return to spawn are the survivors. If most of the survivors come from a distinct population, then we need to know which population survive and why. This will allow managers to protect the most important populations and also identify those environmental variables needed to enhance other populations.

**Science Panel Comments:**

This proposal was submitted by the southeast Alaska Sitka Tribe. It is well-written and in context, responsive to the Invitation. The Sitka stock is healthy, and it would be valuable to understand the habitats associated with herring in those areas vs. areas inhabited by the depressed herring stocks of PWS.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Concur with Science Panel.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

I concur with the Science Panel and Science Director and the recommendation of the PAC.

**Executive Director Recommendation:** Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund



**Project Number:** 080822  
**Project Title:** Herring Data and Information Portal  
**Principal Investigator:** Steven Moffitt  
**Affiliation:** ADFG  
**Co-PIs/Personnel:** Rob Bochenek  
**Disbursing Agency:** ADFG  
**Project Location:** Prince William Sound  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$204,000.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$204,000.00

**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. Scientists 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, was necessary to understand how restoration activities might affect herring abundance trajectories. Currently there are many herring related data sets that are not easily accessible to restoration researchers and managers. Several restoration projects proposed at the April 2006 meeting would require spatial and temporal knowledge of herring data as input to a model or as a measure of the success of a restoration project. This project would provide easier access and visualization of selected herring data sets and other electronic resources.

**Science Panel Comments:**

The web portal could be used by managers, researchers and the public, and it would provide a central location for historical data.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Concur with Executive Director.

**Restoration Specialist Recommendation:** Do Not Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Do Not Fund

**Executive Director Comments:**

I anticipate that the time frame for the final incorporation of all historical data sets (geospatially enabled) into the data model is going to take much longer than any of us understood and the fully enabled data will not be available until long after the FY07/08 herring projects have completed. With the PWS Herring Restoration Plan scheduled for completion to input into the FY09 Invitation, I am recommending this amendment request be denied and a submission of a well formulated proposal at that time.

**Executive Director Recommendation:** Do Not Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund Contingent

**Project Number:** 080290  
**Project Title:** The Exxon Valdez Trustee Hydrocarbon Database  
**Principal Investigator:** Bonita Nelson  
**Affiliation:** NOAA  
**Co-PIs/Personnel:** Jeff Short  
**Disbursing Agency:** NOAA  
**Project Location:** Project: Auke Bay Lab JNU,AK. Service: entire spill area via internet  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$11,100.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$11,100.00

**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. Additionally, we provide interpretive services for the hydrocarbon analysis, provide public releases of the database which includes several FOIA requests annually and maintain the hydrocarbon sample archives.

**Science Panel Comments:**

This proposal provides ongoing support for maintaining, updating, and servicing of hydrocarbon data that is critical to future evaluations of recovery and restoration. We recommend funding. The only recommendation of the panel was that the web interface be updated in consultation with EVOS Trustee Staff to ensure that it is compatible and non-duplicative with other ongoing web server tasks.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

This database is a long-term project that has been funded by the TC. It provides a storage and archival repository for hydrocarbon data generated from projects centered in the spill-affected area.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

I agree with the Science Panel and Science Director comments and the recommendation of the PAC.

**Executive Director Recommendation:** Fund Contingent

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund

**Project Number:** 080804  
**Project Title:** Significance of Whale Predation On Natural Mortality Rate of Pacific Herring in Prince William Sound  
**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:**

<b>FY08:</b> \$327,800.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$327,800.00

**Abstract:**

Pacific herring (*Clupea pallasii*) 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 proposal is responsive to the Invitation and the PIs are well qualified. Predator impacts on herring, especially in winter, are poorly understood and need to be quantified. The number of whales over-wintering in PWS is growing each year, and it is important to understand their contribution to the population dynamics of herring as part of a successful restoration program. This proposal also incorporates comparisons in whale predation among multiple sites (southeast vs. PWS) with both depressed and healthy populations of herring.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Concur with Science Panel.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Do Not Fund

**Executive Director Comments:**

Concur with Science Panel. However, funding should not be released until the PI complies with Trustee Council approved reporting procedures for projects 050794 - PWS Herring Synthesis and 040620 - Lingering Oil: Pathways of Exposure and Population Status.

**Executive Director Recommendation:** Fund Contingent

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund Contingent

**Project Number:** 080759  
**Project Title:** Harlequin Duck Population Dynamics in Prince William Sound: Measuring Recovery from the Exxon Valdez Oil Spill  
**Principal Investigator:** Daniel Rosenberg  
**Affiliation:** ADFG  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** ADFG  
**Project Location:** Prince William Sound  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$117,400.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$117,400.00

**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 proposal provides a potentially useful tool in evaluating the potential exposure of harlequin ducks and other animals that feed and/or live in the intertidal to lingering oil.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Concur with Science Panel

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Do Not Fund

**Executive Director Comments:**

Harlequin ducks will have recovered when breeding and nonbreeding season demographics and biochemical indicators of hydrocarbon exposure in harlequin ducks in oiled areas of PWS are similar to those in unoiled areas, taking into account geographic differences that are not related to the Exxon Valdez oil spill. The monitoring proposed in this study appears to be a useful tool for the Council to gauge its progress toward meeting this recovery objective. However, there are other Council funded harlequin duck studies and I'm unclear how this proposal fits when compared. I also question whether annual monitoring is necessary. I am aware the PI has consistently done excellent work in his role as PI on Council funded projects. I recommend not funding this proposal in FY08 due to these concerns. If the Council makes a fund decision, I recommend prior to releasing funds, the PI must receive my approval on the following condition:

- Explain how this proposal is or will be integrated with projects: 070816/Esler – Evaluating Harlequin Duck Population Recovery, 070751/Irons – PWS Marine Bird Survey, Synthesis and Recovery, 070750/Bodkin – Database Development for Long-Term Monitoring of Nearshore Resources, and other related projects.

**Executive Director Recommendation:** Do Not Fund

**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:** ADFG  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** ADFG  
**Project Location:** Prince William Sound  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$40,600.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$40,600.00

**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

**Restoration Specialist Comments:**

Not Applicable

**Restoration Specialist 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:** USEPA  
**Co-PIs/Personnel:** None  
**Disbursing Agency:** USGS  
**Project Location:** Prince William Sound  
**Project Type:** New

**Funding Approved by Fiscal Year:**

<b>FY08:</b> \$181,735.00	<b>FY09:</b> \$354,238.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$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

**Restoration Specialist Comments:**

Not Available

**Restoration Specialist 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:** 080806

**Project Title:** Are Herring (*Clupea Pallasii*) 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:**

<b>FY08:</b> \$187,300.00	<b>FY09:</b> \$0.00	<b>FY10:</b> \$0.00
<b>FY11:</b> \$0.00	<b>FY12:</b> \$0.00	<b>FY13:</b> \$0.00

**Total Funding Approved:** \$187,300.00

**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:**

Whole body energy content is measured in herring from three areas in Alaska, and energy consumption rates are compared among healthy (southeast) and depressed (PWS) populations. The strength of this project is the comparison of the depressed PWS population with other, healthy populations. Understanding how the environments differ between areas with healthy fish and those with a stressed population of herring will enhance our knowledge of

factors potentially contributing to the continued decline of herring in PWS.

**Science Panel Recommendation:** Fund

**Restoration Specialist Comments:**

Understanding the state of herring in PWS can only be enhanced by comparing similar attributes (e.g., habitat characteristics, body condition, age and size distribution and abundance, etc) between areas with depressed population and areas with healthy populations. This project is one of the few that is making these comparisons.

**Restoration Specialist Recommendation:** Fund

**Public Advisory Committee Comments:**

Not Available

**Public Advisory Committee Recommendation:** Fund

**Executive Director Comments:**

I concur with the Science Panel and Science Director and the recommendation of the PAC.

**Executive Director Recommendation:** Fund

**Trustee Council Comments:**

Not Available

**Trustee Council Decision:** Fund