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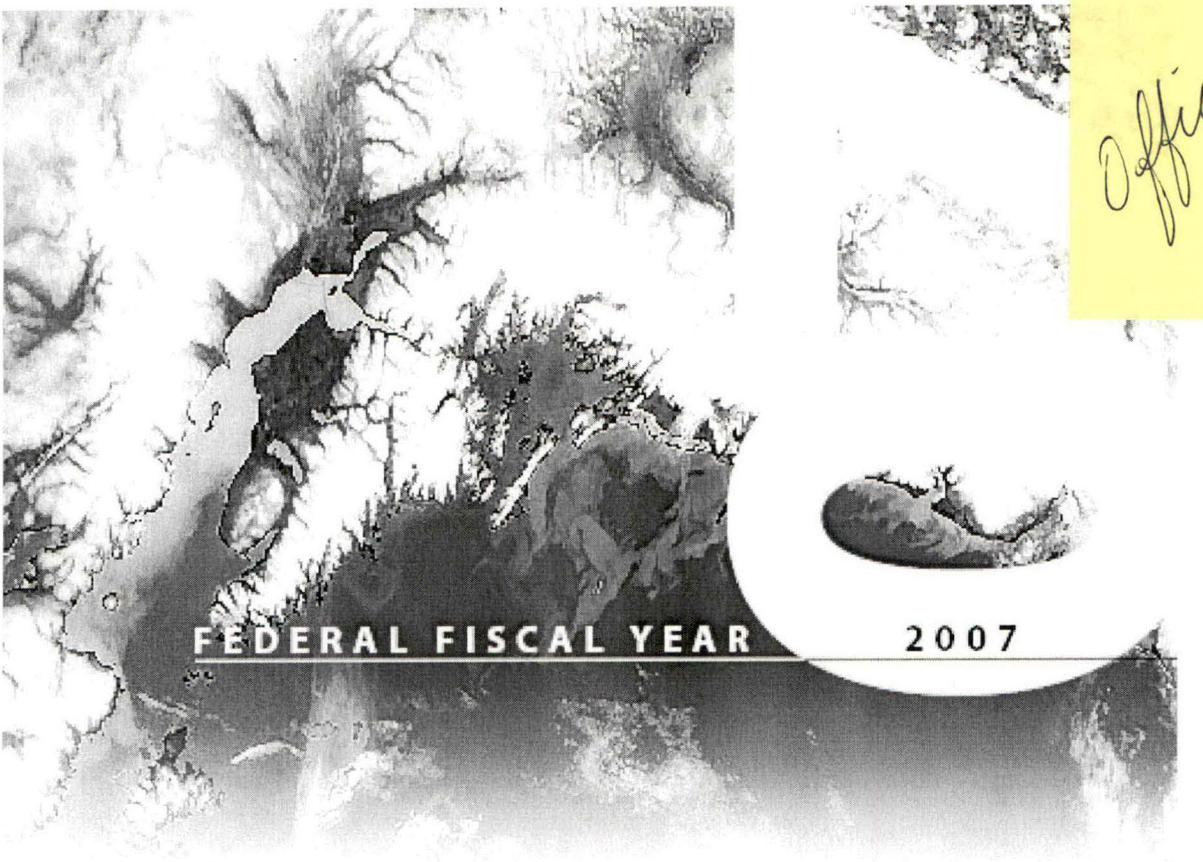

DRAFT WORK PLAN
PART 1 : PACIFIC HERRING

Issued October 2, 2006

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FISCAL YEAR 2007

DRAFT WORK PLAN

October 2, 2006

Prepared by
Exxon Valdez Oil Spill Trustee Council

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Notice

The abstract of each proposal submitted in response to the FY07 Invitation for Proposals was written by the authors of the proposals to describe their projects To the extent that the abstracts express opinions about the status of injured resources they do not 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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EVOSTC FY 2007 Draft Work Plan, Part 1 Pacific Herring 10/02/2006

Dear Reviewer,

Each year, the *Exxon Valdez* Oil Spill Trustee Council funds activities to restore the resources and services injured by the 1989 *Exxon Valdez* oil spill Public input is critical to the Council's decision making process and this draft work plan has been prepared to solicit your comments on which projects to fund in Fiscal Year 2007

In 2006, the Council recognized that a tremendous amount of work had been accomplished over 15 years of research, monitoring and specific activities directed at addressing the restoration and rehabilitation goals of the 1994 Restoration Plan (www evostc state ak us/Policies/restplan htm) However, the Council determined that results of previous efforts needed synthesis in order to better understand the effects of lingering oil and to evaluate the status of injured resources and services They decided to realign priorities and restorative activities, placing focus on critical work required to reach closure in areas of restoration related to lingering oil and injured resources The Council's priorities are outlined in the Interim Guidance Document (IGD), www evostc state ak us/Policies/igd htm

Several resources in the Sound continue to be affected by the spill and have been monitored closely by the Council While the 1994 Restoration Plan establishes a plan for the restoration of all injured resources and services in the Sound, the current critical status of the Pacific herring requires immediate attention The Council has identified the need for a comprehensive herring restoration program that will help re-establish the declining herring population in Prince William Sound for use by both the commercial fisheries and local subsistence communities

Herring are an important component of the Sound ecosystem, both ecologically and commercially Herring were initially impacted by the oil spill, and the Council has continued to classify them as a non-recovering injured resource Pacific herring are an essential part of the marine food web in the Sound and provide food for birds, marine mammals and invertebrates Moreover, herring have been fished commercially for food, bait, sac-roe and spawn-on-kelp The fishery in the Sound collapsed in 1993, four years after the spill, and since then a consistent fishery has not been sustainable Because herring are a forage fish for many other species, it is speculated that the decline of herring has also had deleterious effects on other animals that depend on them for food The Council appreciates the dire situation of PWS herring and the ecological and human impact caused by their decline Therefore, the Council has committed to develop a long-term Herring Recovery Plan and implement enhancement activities with the ultimate goal of assisting herring recovery in the Sound A restoration planning effort will begin in late 2006 This collaborative planning process will include subsistence-resource users, government agency representatives, non-governmental organizations (NGO), commercial fishermen, scientists and other stakeholders The Recovery Plan will define critical decision pathways needed to make progress in herring recovery and provide a structure for evaluating and assessing decisions and actions as the recovery effort progresses

The following draft work plan, entitled "**Draft Work Plan, FY07, Part 1 Pacific Herring**", contains proposal information and funding recommendations for herring-related projects, only The Trustee Council also received non-herring related proposals in response to the FY07 Invitation for Proposals, and these will be evaluated by the Trustee Council in meetings held

later this year The "**Draft Work Plan, FY07, Part 2 Injured Resources and Services**" will be published for public review prior to funding decisions by the Trustee Council Check our website, (www evostc state ak us) periodically for updates

I am interested in your thoughts and ideas in regard to this draft work plan, as well as our restoration plan in general Comments on this draft work plan need to be received at the Trustee Council office by COB October 31, 2006 Please see the "Please Comment" section prior to the Table of Contents for more information regarding how to submit comments

Sincerely,

Michael Baffrey
Executive Director

PLEASE COMMENT

You can help the Trustee Council by reviewing this draft work plan and letting us know your priorities for Fiscal Year 2007 To be most useful, your comments should be received by the Council on or before October 31, 2006 You can comment by

Mail	Exxon Valdez Oil Spill Trustee Council 441 W 5th Avenue, Suite 500 Anchorage, AK 99501 Attn Draft Fiscal Year 2007 Work Plan
Telephone	1-800-478-7745 (within Alaska) 1-800-283-7745 (outside of Alaska) Collect calls will be accepted from fishers and boaters who call through the marine operator
Fax	907-276-7178
E-mail	projects@evostc state ak us

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Acknowledgements

We are pleased to acknowledge Trustee Council staff members Carrie Holba, Michael Schlei, Cherri Womac, Barbara Hannah, Catherine Boerner, and Colleen Keane whose hard work and dedication made this Draft Work Plan possible Special thanks to the anonymous scientists who peer reviewed the proposals received this year and thanks also to the principal investigators and their collaborators for giving us so many fine proposals from which to choose in building our program Many thanks to those scientists from Trustee Council agencies that provided help, and in particular we offer special thanks to Dede Bohn, Carol Fries, Pete Hagen, Hans Neidig, Heather Brandon, Jenifer Kohout, Jennifer Thomson, Larry Dietrick, and Steve Zemke We also owe our thanks for their expert program guidance and peer review efforts to the members of the Science Panel (Steve Braund, Ron O'Dor, Gary Cherr, Tom Dean, Robert Spies, Charles (Pete) Peterson and Leslie Holland-Bartels)

Michael Baffrey, Executive Director

Kimberly A Trust, Science Director

Overview of the FY07 Work Plan

The Draft Work Plan comprises multi-year projects submitted in previous years which have received continuous funding by the Trustee Council and new proposals received in response to the FY07 Invitation for Proposals This document allows the Council to review the projects proposed for fiscal year 2007, and the funding requested to implement the proposed work This year the Draft Work Plan is divided into two sections **FY07 Draft Work Plan, Part 1 Pacific Herring** and **FY07 Draft Work Plan, Part 2 Injured Resources and Services** Upon final funding decisions by the Trustee Council, these two sections will be condensed into one final Work Plan for 2007 Each section of the Draft Work Plan contains basic information about an individual proposal and its complete record of funding recommendations during the review process Recommendations from the Science Panel and preliminary recommendations of the Science Director and Executive Director are included in this draft The recommendations of the Public Advisory Committee (PAC) will be added prior to the Draft Work Plan's review by the Trustee Council

Part 1 of the FY07 Draft Work Plan, enclosed here, presents those proposals that focus on the restoration of Pacific Herring The lack of recovery of the Pacific Herring has been identified as a priority for 2007, primarily because the herring fishery in the Sound has been closed for 11 of the 17 years since the spill After the 1993 'crash', the population began increasing in 1997 and the fishery was opened briefly in 1997 and 1998 However, the population stalled in 1999, and the fishery has been closed since then, including 2006 No trend suggesting healthy recovery has occurred over the last eight years

Twenty-six herring-related proposals were received by the Trustee Council and the proposed work fell roughly into several key areas habitat, predation/disease, juvenile survival, population modeling and data management The total requested funding for herring projects in FY07 is $5,247,300 and the total requested funding for herring projects over the next three years is $14,141,200 Twenty-seven additional proposals were received by the Trustee Council for review and 12 project ideas were submitted for consideration by the Trustee Council for full proposal development These projects will be presented in Part 2 of the Draft Work Plan which will be released later this year

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

Projects Currently Funded Through FY07*

PI	Project #	Title	Funding to Date	FY07 Funding
Matkin	050742	Monitoring of Killer Whales in PWS/Kenai Fjords in 2005-2007	$42,800	$23,800
Baird	050743	Linking Shoreline Mapping with Community-Based Monitoring	$57,800	$11,900
Hoover/Miller	050749	Harbor Seal Monitoring in Southern Kenai Peninsula Fjords	$223,000	$82,300
Short	050763	Long-term Monitoring of Anthropogenic Hydrocarbons	$117,800	$58,900
Willette	050765	Improving Preseason Forecasts of Kenai River Sockeye Salmon Runs	$134,700	$67,000
Otis	050769	Temporal Stability of Fatty Acids used to Discriminate Pacific Herring	$157,100	$25,100

*The Trustee Council has already approved funding for these projects in FY07

Summary of Funding Recommendations for FY07

PI	Title	Total Funding Requested	Science Panel	Science Director (Preliminary)	Executive Director (Preliminary)
Adams	Pacific Herring Restoration	$252,900	Do Not Fund	Do Not Fund	Do Not Fund
Allee/Norcross	Herring Restoration Workshop	$193,100	Do Not Fund	Do Not Fund	Do Not Fund
Batten	Continuous Plankton Data Recorder	$135,400	Fund	Do Not Fund	Do Not Fund
Bickford	Marking Pacific Herring Otoliths in PWS	$158,300	Do Not Fund	Do Not Fund	Do Not Fund
Bickford/Norcross	Identifying Herring Natal and Nursery Habitats	$344,500	Fund Contingent	Fund Contingent	Not Yet Available
Bishop	Seabird Predation on Juvenile Herring in PWS	$609,200	Fund Contingent	Abstain	Fund Contingent
Castellini/Norcross	Herring Restoration in PWS Condition Indices	$540,300	Do Not Fund	Do Not Fund	Do Not Fund
Cokelet	Biophysical Observations Aboard Alaska Marine Highway System Ferries	$686,900	Do Not Fund	Do Not Fund	Do Not Fund

PI	Title	Total Funding Requested	Science Panel	Science Director (Preliminary)	Executive Director (Preliminary)
Crawford	Characterization of Pacific Herring Nursery Habitat in PWS	$580,600	Fund Contingent	Fund Contingent	Fund Contingent
Gay	Physical Oceanographic Factors Affecting Juvenile Pacific Herring Nursery Habitats	$157,000	Fund Contingent	Fund Contingent	Fund Contingent
Herschberger	PWS Herring Disease Program	$1,074,600	Fund Contingent	Fund Contingent	Fund Contingent
Kiefer	An Ecosystem Model of PWS	$690,300	Fund Contingent	Fund Contingent	Fund Contingent
Kline	PWS Herring Forage Contingency	$907,500	Fund Contingent	Fund Contingent	Not Yet Available
Lindeberg	ShoreZone Mapping for PWS	$661,100	Fund Contingent	Fund Contingent	Fund Contingent
Linley	Development of Culture Technology to Support Restoration of Herring in PWS	$1,342,200	Fund Contingent	Fund Contingent	Fund Contingent
Meuret-Woody	Habitat for Pacific Herring in Sitka Sound	$159,000	Fund Contingent	Fund Contingent	Not Yet Available
Moffitt	Herring Data and Information Portal	$132,100	Fund Contingent	Fund Contingent	Fund Contingent
Mullins/Patrick	Herring Restoration Activity Involving Herring Egg Translocation	$3,001,800	Do Not Fund	Do Not Fund	Do Not Fund
Otis/Bickford	Using Otolith Chemistry to Discriminate Pacific Herring Stocks	$69,200	Fund	Fund	Fund
Rice	Significance of Whale Predation on Natural Mortality Rate of Pacific Herring in PWS	$513,600	Fund	Fund	Not Yet Available
Thorne	Trends in Adult and Juvenile Herring Distribution and Abundance in PWS	$433,600	Fund	Fund	Fund
Thorne/Crawford	Restoration & Management Applications Workshop	$68,100	Do Not Fund	Do Not Fund	Do Not Fund
Thorne/Frid	Modeling Ecological Interactions Between Stellar Sea Lions and Pacific Herring	$149,200	Do Not Fund	Do Not Fund	Do Not Fund
Vollenweider	Are Herring Energetics in PWS a Limiting Factor in Successful Recruitment of Juveniles and Reproduction Investment of Adults?	$140,500	Fund	Fund	Fund
Wang	Herring Restoration in PWS-Modeling Circulation and Larval Transport	$311,500	Fund Contingent	Not Yet Reviewed	Do Not Fund

PI	Title	Total Funding Requested	Science Panel	Science Director (Preliminary)	Executive Director (Preliminary)
Weingartner	Long-Term Oceanographic Monitoring of the Alaska Coastal Current	$389,000	Fund	Fund	Fund
Wright	Salmon Sharks Preying on Aggregated Herring and Salmon in PWS	$439,700	Do Not Fund	Do Not Fund	Do Not Fund

TOTAL FY07 FUNDING REQUESTED $5,247,300
TOTAL FUNDING REQUESTED $14,141,200

Proposed Projects

Acronyms
ADEC – Alaska Department of Environmental Conservation
ADFG – Alaska Department of Fish and Game
DOI – US Department of Interior
EVOS – Exxon Valdez Oil Spill
FWS – US Fish and Wildlife Service
NOAA – National Oceanic and Atmospheric Administration
PWS – Prince William Sound
PWSFRAP- Prince William Sound Fisheries Research Application and Planning
PWSSC – Prince William Sound Science Center
UAF – University of Alaska, Fairbanks
USGS – US Geologic Survey

Project	**EVOS Administration**
Project Title	Annual Program Development and Implementation
Location	Anchorage, AK
Principal Investigator	EVOS Administration

Funding Requested by Fiscal Year

FY07 $1,831,257

Total Funding Requested

$1,831,257

Abstract

The Council adopted a new budget structure in FY 2006 in order to more clearly identify the allocation of funds supporting Trustee Council activities The presentation of the initial Annual Program Development and Implementation Budget instituted in FY 2006 is being mirrored within the submittal of this funding request for FY 2007 The intent is to continue emphasizing the estimated costs associated with the current activities and directives of the Trustee Council

This budget has been developed with the focus on completing the Trustee Council's planned activities detailed within the "Interim Guidance Document" implemented in August of 2005 and effective through December 2006, as well as initiating any restoration planning efforts resulting from the determinations regarding the fate and impact of lingering oil in the spill area and the status of injured resources and services identified in the updated list

In addition, this budget expands upon activities started in FY 2006 toward developing a plan for herring recovery, and includes estimates of the direct and indirect costs of the Trustee Council's agencies and administrative office, in providing services for the Trustee Council's programs and approved projects of FY 07

The "Program Development and Implementation Budget" includes the following components

- •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 (ARLIS)

Various aspects of the italicized components are undertaken by Trustee Council agencies providing program development and administrative support

Although funding for liaisons, project managers, and other support staff is included in the Program Support and Project Management component, the final budget for this component cannot be accurately determined until the Trustee Council takes action on the FY 07 Work Plan This component is an initial funding request Upon adoption of the FY 07 Work Plan, additional project management funds for each agency will be requested in proportion to the number and complexity of funded projects assigned to each agency for management At that time the budget will be revised to reflect this additional expense

The Trustee Council Office is administratively located within the Alaska Department of Fish and Game Allocation of funds by agency is detailed within the Budget Summary

NOTE THIS BUDGET HAS ALREADY BEEN APPROVED BY THE TRUSTEE COUNCIL

Project	**Adams-Pacific Herring Restoration**
Project Title	Pacific Herring – From Familiar Inquiry to Uncharted Restoration A Project to Aid Coordination, Compliance, and Rapid Integration
Location	PWS and Cordova
Principal Investigator	Ken Adams
Affiliation	PWSFRAP
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $252,900 FY08 $0 FY09 $0 FY10 $0

Total Funding Requested

$252,900

Abstract

The year 2006 may well be remembered as the year that restoration of Pacific herring moved from inquiry to intervention Whether the year will a success technically will depend less on what we know now than on how we use what is know This project provides three parts of a larger collection that together enable first trial interventions to be conducted in April 2007 This project provides a means for independently prepared proposals to coordinate efforts and improve outcomes It provides assistance to collaborators who need the models developed over the past 12 years of Restoration to be able to reliably and efficiently carry out interventions and track the outcomes

Science Panel Comments The strength of this proposal is the involvement from the residents of Cordova that have been affected by the spill It is hoped that the PIs will remain active participants in the process of a developing herring restoration program However, this proposal is poorly written and not well organized The project fails to demonstrate links to herring restoration because the objectives are not clear and methods are vague The Panel does not recommend funding this proposal because the ultimate outcome and/or products of this project are unknown RECOMMENDATION DO NOT FUND

Science Director Comments Concur with Science Panel RECOMMENDATION DO NOT FUND

Executive Director Comments RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Allee/Norcross-Herring Restoration Workshop**
Project Title	Herring Restoration in PWS Enhancement Workshop
Location	PWS
Principal Investigator	Brian Allee, Brenda Norcross
Affiliation	Sea Grant/UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $126,500 FY08 $66,600 FY09 $0 FY10 $0

Total Funding Requested

$193,100

Abstract

In response to the decline of herring in PWS, the EVOS Council has committed to develop a long-term Herring Restoration Plan, and to implement enhancement activities with the ultimate goal of assisting herring recovery in the Sound This plan calls for the identification and evaluation of national and international efforts related to herring enhancement We propose to hold an international workshop on herring enhancement Leading authorities on enhancement of herring and related species will be invited, and a call for papers will yield additional presentations on research, techniques and existing enhancement programs Immediately following the workshop the Steering Committee will compose an Executive Summary for the EVOSTC and compile all of the Power Point presentations given at the workshop In the following fiscal year, Alaska Sea Grant College Program will produce a fully peer-reviewed proceedings of the papers submitted for this workshop

Science Panel Comments The proposal is well-written, concise and responds to the Invitation The PI's are well-qualified However, costs seem high for a two-day conference No clear explanation is given of how the products will benefit the herring restoration process The main deliverables are an executive summary produced immediately after the conference and a peer reviewed workshop Proceedings document The Proceedings, produced several years after the meeting will not meet the immediate needs of a developing herring restoration program RECOMMENDATION DO NOT FUND

Science Director Comments Concur with Science Panel The Alaska SeaGrant program has experience organizing these types of events and would likely do an excellent job in presenting a workshop However, the costs seem high and input from the international community into a herring recovery program needs to be expedited Final deliverables from the proposed workshop will not be available for two years The Trustee Council needs information on enhancement/ restoration options for herring sooner than that RECOMMENDATION DO NOT FUND

Executive Director Comments The Trustee Council has approved funding for both an international herring restoration workshop and a herring restoration plan/team in the FY07 Administrative Budget It is hopeful the PI's will participate in the planning and implementation of these activities RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Batten-Continuous Plankton Data Recorder**
Project Title	Acquisition of Continuous Plankton Recorder data
Location	Cook Inlet
Principal Investigator	Sonia Batten
Affiliation	BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $135,400 FY08 $0 FY09 $0 FY10 $0

Total Funding Requested

$135,400

Abstract
This project will use a Continuous Plankton Recorder to collect plankton samples from the Alaskan shelf and Gulf of Alaska to determine variability in abundance and distribution of herring prey Understanding variability in their food source is one requirement for understanding variability in Prince William Sound herring populations Recent CPR data have shown large differences in mesozooplankton biomass on the Alaskan shelf in 2004 and 2005 This project will increase the time series of data collected with previous EVOS TC funding and improve our understanding of how the food chain supporting Alaskan fisheries is regulated

Science Panel Comments This project has been funded for several years by the Trustee Council and funds are being requested for an additional year This project provides the only long term record of plankton abundance and species composition important to understanding the inter-annual variation in herring food from the Gulf of Alaska This information is necessary to understand herring mortality and long term trends in herring abundance This project is cost effective because the PI is utilizing ships of opportunity transecting the entire Gulf of Alaska thus funding for a vessel is not required RECOMMENDATION FUND

Science Director Comments This project collects important long-term plankton trend data across the Gulf of Alaska and is very cost effective because the instruments are located on ships of opportunity and vessel costs are not needed However, the vessel routes have recently changed and the ships no longer move through Prince William Sound they go into Cook Inlet Although the link between these data and Prince William Sound herring likely exist, the tie is not clear in the proposal This project is scientifically solid, and the data are important, but the connection to Trustee Council concerns is not strong RECOMMENDATION DO NOT FUND

Executive Director Comments RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Bickford-Herring Restoration**
Project Title	Herring Restoration in PWS Marking Pacific Herring (*Clupea pallasi*) Otoliths in Prince William Sound
Location	PWS
Principal Investigator	Nate Bickford
Affiliation	UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $67,000 FY08 $91,300 FY09 $0 FY10 $0

Total Funding Requested

$158,300

Abstract

The success of relocating of Pacific herring to more suitable habitats will need to be monitored by mass marking groups of herring We need to know if it is feasible to use otoliths to mass mark herring using Sr and Ba with low mortality and low cost Once we know that it is possible to artificially mark herring otoliths in a controlled environment we will mark herring in natural habitats found in PWS We will then collect the marked herring from PWS If artificial mass marking of otoliths is successful, then we will have a tool that manages and researchers will be able to use to monitor the success of relocating Pacific herring to more suitable habitats in PWS RECOMMENDATION DO NOT FUND

Science Panel Comments While this proposal is responsive to the Invitation and entails good project management, it did not demonstrate that the planned methods would provide a cost effective mass marking tool for herring Other methods (e g fluorescent dye technologies) are currently being used commercially and have a wider range of application The proposed method only provides the ability to distinguish between two marked cohorts of fish Moreover, it is unclear if the PI's considered disease and mortality factors in their field work Finally, even if the proposed tools could be developed, it is uncertain that a sufficient number of marked fish could be recaptured to provide meaningful estimates of survival RECOMMENDATION DO NOT FUND

Science Director Comments Concur with Science Panel RECOMMENDATION DO NOT FUND

Executive Director Comments RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Bickford/Norcross-Herring Restoration**
Project Title	Herring Restoration in PWS Identifying Natal and Nursery Habitats
Location	PWS
Principal Investigator	Nate Bickford, Brenda Norcross
Affiliation	UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $125,200 FY08 $138,300 FY09 $81,100 FY10 $0

Total Funding Requested

$344,500

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

Science Panel Comments This proposal is responsive to the Invitation and the PIs are well-qualified to do the work The project provides for the development of a potentially important technique that would allow identification of habitat favorable for juvenile herring survival If successful, the method could be used to identify those areas that yield healthy juveniles which are eventually recruited into the population as adults The proposal is recommended for funding contingent on a few minor revisions The methods do not clearly describe how the technique used by the PIs will allow them to identify the location that an individual fish spent it's natal or juvenile period Additionally, the statistical analyses are not well described and their sample sizes should be justified The project would greatly benefit from coordination with similar efforts proposed by Meuret-Woody A combination of these two proposals would allow a comparison of the technique between healthy (Sitka) and depressed (PWS) herring populations RECOMMENDATION FUND CONTINGENT

Science Director Comments Concur with Science Panel This project will result in the identification of bays in PWS used as natal habitat by different cohorts of herring Upon determining where fish are raised, specific characteristics of these bays can be measured This will then help decide where enhancement/restoration activities best succeed Reduce funding by the amount needed for meeting travel other than the annual EVOS meeting RECOMMENDATION FUND CONTINGENT

Executive Director Comments Not yet available

Public Advisory Council Comments Not yet available

Project	**Bishop/Kuletz-Herring Restoration**
Project Title	Seabird Predation on Juvenile Herring in Prince William Sound
Location	PWS
Principal Investigator	Mary Anne Bishop, Katherine Kuletz
Affiliation	PWSSC
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $197,000 FY08 $204,300 FY09 $196,000 FY10 $11,900

Total Funding Requested

$609,200

Abstract

Based on population trends, the PWS Pacific herring population does not show signs of recovering Predation pressure on juvenile herring may be an important factor in preventing recovery 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 predated by multiple species of seabirds including five species injured by *EVOS*, 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 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 with revisions The authors need to specifically identify how the project will provide an estimate of the number and sizes of herring being eaten by birds in the winter Also, it is unclear how this data is to be used in a comprehensive life history model of herring and how they will extrapolate their information to all of PWS The panel suggests the PI's consider aerial surveys to provide a Sound-wide estimate of abundance and distribution of seabirds feeding on herring RECOMMENDATION FUND CONTINGENT

Science Director Comments Not Reviewed The Science Director is on a detail from the FWS and must recuse herself from making recommendations on proposals that involve FWS personnel The co-PI on this project is an employee of the FWS RECOMMENDATION ABSTAIN

Executive Director Comments Concur with Science Panel but would require aerial surveys to provide a Sound-wide estimate of abundance and distribution of seabirds feeding on herring RECOMMENDATION FUND CONTINGENT

Public Advisory Council Comments Not yet available

Project	**Castellini/Norcross-Herring Restoration**
Project Title	Herring Restoration in PWS Condition Indices
Location	PWS
Principal Investigator	Michael Castellini, Brenda Norcross
Affiliation	UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $165,000 FY08 $195,700 FY09 $179,600 FY10 $0

Total Funding Requested

$540,300

Abstract

UAF is proposing a suite of integrated proposals to better understand PWS herring and address future enhancement experiments to improve the survival rate of juvenile fish This project collects information on the condition of herring collected at various nurseries by the field components (Bickford/Norcross) We measure herring energy content and use recently enhanced chemical methods for the analysis of feeding history of the fish These data are used in a multi-factorial herring condition index that is correlated to morphometric values easily measured in the field This condition index, by itself, is a major product from this work The herring condition will then be input into the survivorship and distribution models for different herring nurseries in PWS organized by Norcross The ultimate goal will be to provide the data necessary to evaluate the recovery of PWS herring and the possibility of population enhancement methods

Science Panel Summary The PI for this project is well known as an expert in this type of analysis The proposal responds to the Invitation and is well written However, the condition index described for the project already exists and the project seems redundant to work completed under the SEA project It is unclear whether refinement of this technique will provide incrementally significant understanding of the importance of energy reserves on herring survival Moreover, the index would be most useful if there was a comparison between a healthy herring population and the one in PWS This is not proposed RECOMMENDATION DO NOT FUND

Science Director Comments Concur with Science Panel RECOMMENDATION DO NOT FUND

Executive Director Comments RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Cokelet/Mordy/Pegau-AK Marine Highway Ferries**
Project Title	Biophysical Observations Aboard Alaska Marine Highway System
Location	PWS and Alaska Coastal Current
Principal Investigator	Edward Cokelet, Calvin Mordy, Scott Pegau
Affiliation	NOAA
Disbursing Agency	NOAA

Funding Requested by Fiscal Year

FY07 $300,300 FY08 $188,100 FY09 $198,500 FY10 $0

Total Funding Requested

$686,900

Abstract

Oceanographic monitoring is essential to deliver real-time ecosystem information for public and advisory use, to provide boundary conditions for numerical models and to put the marine ecosystem into an historical perspective that can reveal long-term developmental, climatic and anthropogenic changes In PWS it is important to monitor water temperature because it affects the Pacific herring fishery through alterations in spawning timing, metabolic rate and feeding, and wintertime resistance to disease Salinity affects circulation, therefore herring larval dispersal Circulation models used to predict herring larval drift require periodic calibration to actual temperature and salinity observations to give realistic results In September 2004, we installed an EVOS-funded monitoring system aboard the Alaskan ferry M/V *Tustumena* that operated in two oil-spill areas, PWS and the Alaska Coastal Current (ACC) The monitoring system measures water temperature, salinity, and indicators of essential nutrients, phytoplankton biomass, freshwater influence and sediment load The system operated successfully in PWS until May 2005 when the ferry was reassigned to ACC routes only We propose to add a similar oceanographic monitoring system in PWS to the Alaskan ferry M/V *Aurora*, a volunteer observing ship that transits the sound daily These observations will complement the present data set Furthermore, we propose to continue *Tustumena s* ACC measurements at marginal cost to monitor essential biophysical variables in the coastal Gulf of Alaska

Science Panel Comments This project is a continuation of an existing project that collects chemical/physical measurements of the water in Prince William Sound The PI was responsive to the Invitation and is qualified to continue the research However, this project is expensive and is conducted from a potentially unreliable ship of opportunity (Alaska Marine Ferry System) Also, the direct link to herring restoration is not made, and it was difficult to determine if the timing and geographic coverage of this project would provide information towards enhancing herring recovery RECOMMENDATION DO NOT FUND

Science Director Comments Concur with Science Panel RECOMMENDATION DO NOT FUND

Executive Director Comments RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Crawford-Pacific herring nurseries**
Project Title	Characterization of Pacific Herring Nursery Habitat in Prince William Sound
Location	PWS
Principal Investigator	Richard Crawford
Affiliation	BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $271,800 FY08 $146,700 FY09 $162,100 FY10 $0

Total Funding Requested

$580,600

Abstract

A method for identifying the location of Pacific herring nursery grounds in Prince William Sound is needed as a basis for restoration The SEA study established that juvenile herring prefer bays and fjords but smaller-scale resolution of nursery habitat remains to be elucidated This study will collect high resolution information on the distribution of juvenile herring and their prey, and concomitant descriptors of extant hydrographic conditions, in three areas known to contain herring spawning and nursery habitat A statistical model will be developed that delineates nursery habitat within a water body to provide managers with a tool for locating nursery habitat elsewhere in the Sound Field work involves collecting detailed hydrographic information (undulating profiler operated between surface and up to 50 m, horizontal profiler measuring ~ 1 m surface layer) while hydroacoustic measurements of water column biomass are being made Trawl nets (fish and plankton) will groundtruth hydroacoustic data sets

Science Panel Comments This is one of the few projects that provide important environmental information on physical/chemical characteristics of herring nursery habitat at a fine scale (i e , nursery bays) The panel suggests that the PI work with Gay to provide these types of data on a greater number of sites in PWS at multiple scales The project is responsive to the Invitation, Appendix A It is well-written and technically strong RECOMMENDATION FUND CONTINGENT

Science Director Comments Concur with Science Panel This project is a continuation of some aspects of the SEA program but at a smaller geographic scale The proposal is technically strong and will use novel methods to define optimal habitat for juvenile herring RECOMMENDATION FUND CONTINGENT

Executive Director Comments RECOMMENDATION FUND CONTINGENT

Public Advisory Council Comments Not yet available

Project	**Gay-Juvenile Herring Nursery Habits**
Project Title	Physical Oceanographic Factors Affecting Productivity in Juvenile Pacific Herring Nursery Habitats
Location	PWS
Principal Investigator	Shelton Gay, III
Affiliation	BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $73,400 FY08 $58,100 FY09 $25,500 FY10 $0

Total Funding Requested

$157,000

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 proposal is responsive to the Invitation and the PI is qualified to complete the work This project is an expansion of a four bay study initiated under the Sound Ecosystem Assessment (SEA) program to examine hydrographic and circulation patterns in PWS It will share a platform and information with projects collecting plankton data (Kline) and distribution and abundance measurements of herring (Thorne) Gay should work closely with Crawford to combine similar data collections on multiple geographic scales The Panel also recommends that at least two addition CDT units be deployed in PWS and additional funding be provided to the PI for these units RECOMMENDATION FUND CONTINGENT

Science Director Comments Concur with the Science Panel, and strongly recommend the additional CDT's are funded and deployed RECOMMENDATION FUND CONTINGENT

Executive Director Comments Fund and require additional CDT's be deployed RECOMMENDATION FUND CONTINGENT

Public Advisory Council Comments Not yet available

Project	**Hershberger -PWS Herring Disease Program**
Project Title	Prince William Sound Herring Disease Program
Location	PWS
Principal Investigator	Paul Hershberger
Affiliation	DOI/USGS
Disbursing Agency	DOI

Funding Requested by Fiscal Year

FY07 $257,500 FY08 $265,100 FY09 $272,100 FY10 $279,900

Total Funding Requested

$1,074,600

Abstract

A leading hypothesis accounting for the decline and failed recovery of the herring population in PWS 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 RECOMMENDATION FUND CONTINGENT

Science Director 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 RECOMMENDATION FUND CONTINGENT

Executive Director Comments RECOMMENDATION FUND CONTINGENT

Public Advisory Council Comments Not yet available

Project	**Keifer/Brown-Herring Modeling**
Project Title	An Ecosystem Model of Prince William Sound Herring A Management & Restoration Tool
Location	PWS
Principal Investigator	Dale Keifer, Evelyn Brown
Affiliation	BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $230,100 FY08 $230,100 FY09 $230,100 FY10 $0

Total Funding Requested

$690,300

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 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 RECOMMENDATION FUND CONTINGENT

Science Director 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 up till now has not been developed RECOMMENDATION FUND CONTINGENT

Executive Director Comments Fund but require the PIs accelerate model development as suggested by the Science Panel RECOMMENDATION FUND CONTINGENT on the condition that the Draft Final Report for Project 030052/Brown – Tribal Natural Resource Stewardship is received prior to Trustee Council funding consideration

Public Advisory Council Comments Not yet available

Project	**Kline-Herring Forage Contingency**
Project Title	Prince William Sound Herring Forage Contingency
Location	PWS
Principal Investigator	Thomas Kline
Affiliation	BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $282,000 FY08 $355,400 FY09 $270,100 FY10 $0

Total Requested Funding

$907,500

Abstract

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

Science Panel Comments 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 The Panel recommends that this project be funded, however, it is expensive and costs should be re-evaluated RECOMMENDATION FUND CONTINGENT

Science Director Comments Concur with Science Panel This project will provide useful comparisons between juvenile herring condition and food availability and source However, the costs are high and should be re-evaluated prior to funding decisions RECOMMENDATION FUND CONTINGENT

Executive Director Comments Not yet available

Public Advisory Council Comments Not yet available

Project	**Lindberg-Shore Zone Mapping**
Project Title	*ShoreZone* Mapping for Prince William Sound
Location	PWS
Principal Investigator	Mandy Lindberg
Affiliation	NOAA
Disbursing Agency	NOAA

Funding Requested by Fiscal Year

FY07 $237,900 FY08 $423,200 FY09 $0 FY10 $0

Total Funding Requested

$661,100

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 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

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 RECOMMENDATION FUND CONTINGENT

Science Director 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 RECOMMENDATION FUND CONTINGENT

Executive Director Comments Concur with Science Panel RECOMMENDATION FUND CONTINGENT

Public Advisory Council Comments Not yet available

Project	**Linley/Betka/Ferren-Herring Restoration**
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
Location	PWS
Principal Investigator	Tim Linley, Marlies Betka, Howard Ferren
Affiliation	Sea Life Center/BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $50,000 FY08 $417,100 FY09 $517,500 FY10 $0

Total Funding Requested

$984,600

Abstract

Intervention in the form of artificial propagation may be needed to restore Prince William Sound (PWS) herring to levels capable of supporting a healthy ecosystem as well as sustainable fisheries We propose to test and refine propagation methods through laboratory and field studies over a three year period to evaluate the likely benefits and costs of stock restoration The overall objective is to obtain biological and economic benchmarks of stock enhancement strategies by integrating established techniques for laboratory rearing of herring with state of the art methods used in the culture of multiple marine species Our specific efforts will focus on the role of calcium sensing receptor proteins in herring osmoregulation, nutrition and immune function The results will provide PWS stakeholders and other researchers with improved understanding of the optimal husbandry and nursery conditions for herring stock enhancement, and the potential effects of such restoration on PWS herring

Science Panel Comments If direct enhancement or other types of intervention is a likely direction that a herring restoration program will pursue, then captive rearing and propagation of herring will be needed This proposal is the only project that seeks to develop culture techniques suitable for herring in Alaska The PIs have a great deal of experience with fish culture (mostly salmon), but it is unclear how much experience they have with herring Herring culture techniques have been successfully implemented in Japan, and the panel believes that the PIs would benefit from learning how those methods that can be used in Alaska Therefore, they recommend a reduction in the first year of funding to $60,000 for the PI's to collaborate with the Japanese on herring culture techniques In the second year, the PI's should submit a reworked proposal They should remove the calcium receptor gene objective, because it is unclear how that relates to herring They should consider a larger range of environmental factors in their culture methods and analyze their effects on growth and survival The PIs also need to define a source for their captive fish, describe how they will consider the role of disease in their work and resolve permitting issues RECOMMENDATION FUND CONTINGENT

Science Director Comments Concur with Science Panel If direct intervention or enhancement activities are eventually recommended for PWS herring, an understanding of culture techniques

and large-scale production will be necessary The PIs have experience in fish culture, (although their experience with herring is not clear in the proposal), and the Alaska SeaLife Center will provide an excellent facility to establish this program The Japanese have a great deal of experience with commercial scale herring production, and their experience would benefit any program initiated in Alaska Therefore, the PIs should take advantage of one-year seed funding to present a proposal that incorporates established techniques RECOMMENDATION FUND CONTINGENT

Executive Director Comments Concur with Science Panel recommendation and suggest a collaborative effort with other established hatcheries in the PWS area RECOMMENDATION FUND CONTINGENT

Public Advisory Council Comments Not yet available

Project	**Meuret-Woody-Essential Habitat for Herring**
Project Title	Identification of Essential Habitat for Pacific Herring (Clupea pallasi) in Sitka Sound for Comparison to Prince William Sound i e Source vs Sink Habitat
Location	Sitka Sound
Principal Investigator	Heather Meuret-Woody
Affiliation	BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $159,000	FY08 $0	FY09 $0	FY10 $0

Total Funding Requested

$159,000

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 project would be strengthened if the PI incorporated a comparison, using their proposed methods between herring in Sitka with those in PWS The Sitka stock is healthy, and it would be a valuable to understand the habitats associated with herring in those areas vs areas inhabited by the depressed herring stocks of PWS Without this comparison, it is difficult to make a strong connection to the Invitation Therefore, this project should only be funded if the similar proposal by Bickford and Norcross is also funded RECOMMENDATION FUND CONTINGENT

Science Director Comments Concur with Science Panel This project should be funded in conjunction with a similar project being proposed in PWS (BickfordNorcross) RECOMMENDATION FUND CONTINGENT

Executive Director Comments Not yet available

Public Advisory Council Comments Not yet available

Project	**Moffitt-Herring Data and Information Portal**
Project Title	Herring Data and Information Portal
Location	PWS
Principal Investigator	Steve Moffitt
Affiliation	ADFG
Disbursing Agency	ADFG

Funding Requested by Fiscal Year

FY07 $132,100 FY08 $0 FY09 $0 FY10 $0

Total Funding Requested

$132,100

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 assess to information, data, and GIS visualizations Scientist and researchers will utilize the web portal as a resource to assist in consolidating, accessing and synthesizing herring data This project will also develop an ArcPad application for collecting herring aerial survey data directly into a GIS format The project was conceived during an EVOS sponsored workshop in April 2006 that was tasked to identify Prince William Sound herring data gaps and develop restoration or research projects to help herring recovery Participants indicated that knowledge of the spatial and temporal aspects of herring related data sets, e g , herring spawn, was necessary to understand how restoration activities might affect herring abundance trajectories Several restoration projects 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 This is a strong proposal that is well written and responsive to the Invitation The web portal could be used by managers, researchers and the public, and it would provide a central location for historical data The panel recommends that the PI coordinate his efforts with work proposed by Kiefer (if funded), and determine how the database should be populated As submitted, the proposal only identifies funds for an IT professional and a graphic designei For this project to be useful the database needs to be populated and managed, however no funds are requested for data gathering or management of the system The Panel recommends that additional budget items should include funds for populating the database after the structure is created and management of the system The PI should also explain how this project can be incorpoiated into the larger EVOS database RECOMMENDATION FUND CONTINGENT

Science Director The PI must work closely with the EVOS data management staff to ensure a product that is user friendly and available to the public Additionally, two specific areas should be addiessed prior to funding commitments 1) Population of the data base with historic information and 2) Long-term maintenance of the database (i e, not the system but the data) This project will only be useful if it data is incorporated into the system, such that it is available to managers, researchers and the public Also, the data needs to be updated periodically, so it does not become obsolete This will be a valuable tool as the Trustees move forward with

herring recovery, but only if it is maintained with current information RECOMMENDATION FUND CONTINGENT

Executive Director Comments Concur with Science Panel and Science Director recommendations RECOMMENDATION FUND CONTINGENT

Public Advisory Council Comments Not yet available

Project	**Mullins/Patrick-Herring Egg Translocation**
Project Title	Herring Restoration Activity Involving Herring Egg Translocation, Marking and Rearing Larvae to Various Stages & Incorporating Community and Commercial Stakeholders
Location	PWS, Cordova
Principal Investigator	Ross Mullins, Vince Patrick
Affiliation	PWSFWAP
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $705,800 FY08 $1,088,800 FY09 $1,207,200 FY10 $0

Total Funding Requested

$3,001,800

Abstract

Population restoration for herring is generally approached by 1) protecting the diminished stock from exploitation, 2) restoring near-shore spawning habitats – principally intertidal vegetation, and 3) supplementing the damaged stock through ocean ranching involving hatcheries (Japan) We propose an additional supplementing activity to directly enhance the survival of each year-class during the vulnerable larval/early juvenile stage Our approach will be to short-term rear larvae emerging from eggs collected in natal areas, for later release in nurseries determined to be optimal for growth and survival Our understanding of optimal rearing habitat originates from work undertaken on juvenile herring by the Sound Ecosystem Assessment (SEA) program, 1994-99 By protecting a significant fraction of the most vulnerable early stages (post-hatch larvae), and relocating them in optimal rearing areas, our "intervention" will partially by-pass the risky period of larval drift where most believe the bulk of the mortality of a year-class occurs

Science Panel Comments Several major concerns caused the Panel to not recommend this proposal for funding The spill area communities are strongly supportive of an active herring restoration program, however, there are too many uncertainties regarding the success of egg translocation and the proposed larval culture techniques to recommend this project Issues include evidence that suggests translocating herring eggs causes the death of all harvested eggs, disease implications which are not addressed, and permitting issues Additionally, it is unclear if the PI's have experience with herring culture techniques or have examined alternatives to translocation Finally, the methods are not detailed enough to allow the Panel to understand how the PIs will accomplish their objectives or determine success RECOMMENDATION DO NOT FUND

Science Director Comments Concur with Science Panel The PIs are obviously knowledgeable about the issue and have proposed a project they believe will jump-start herring recovery in PWS They are understandably concerned about the condition of herring and have put much thought into direct intervention activities However, much more preliminary information should be collected prior to actively altering herring habitat or translocating herring within PWS Disease containment was not discussed in the proposal, and given the devastating

effects diseases are currently inflicting upon PWS herring, this issue needs to be thoroughly discussed in the context of translocating herring eggs and releasing young reared in captivity Moreover, the proposal does not present supporting evidence that these techniques have worked in other places, and the PIs do not address State and/or Federal permit requirements for their project The proposal should be reworked, such that it includes the topics of concern in these comments and those of the Science Panel These activities should also be discussed as part of a bigger, long-term herring recovery program RECOMMENDATION DO NOT FUND

Executive Director Comments RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Otis/Bickford-Herring Stocks**
Project Title	Using Otolith Chemistry to Discriminate Pacific Herring Stocks in AK
Location	PWS
Principal Investigator	Ted Otis, Nate Bickford
Affiliation	UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $69,200 FY08 $0 FY09 $0 FY10 $0

Total Funding Requested

$69,200

Abstract

This proposal is an extension of EVOS Project 050769, which is currently assessing the temporal stability of stock discrimination criteria derived from fatty acid analysis (FAA) of herring cardiac tissues In 2006, Otis (050769) collected heads from fish sampled for FAA so chemical analysis of the otoliths could be conducted to evaluate which technique was most effective for determining herring stock structure at fine spatial scales In this study, Dr Nate Bickford (EVOS Project 060782) will process those samples using laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) to determine whether otolith chemistry can be used to corroborate FAA techniques for determining fine scale structuring within and among Alaska's herring stocks (e g , Sitka, PWS, Kamishak, Kodiak, Dutch Harbor, Togiak, and Kuskokwim Bay) Results will be published and should allow researchers to better define ecologically significant stock boundaries, likely affecting how commercially exploited herring populations are assessed and managed

Science Panel Comments This project proposes to analyze otoliths from fish collected from a previous TC-funded study Therefore, the samples are already 'in-hand' and the project would be very cost-effective The method provides a corroborating technique (along with fatty acid analysis) that will assist managers in identifying herring stock boundaries, thus the direct management applications are strong RECOMMENDATION FUND

Science Director Comments Concur with Science Panel RECOMMENDATION FUND

Executive Director Comments Concur with Science Panel RECOMMENDATION FUND

Public Advisory Council Comments Not yet available

Project	**Rice/Heintz/Moran-Herring and Killer Whales**
Project Title	Significance of Whale Predetation on Natural Mortality Rate of Pacific Herring in PWS
Location	PWS
Principal Investigator	Stanley Rice, Ron Heintz, John Moran
Affiliation	UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $197,700 FY08 $315,900 FY09 $0 FY10 $0

Total Funding Requested

$513,600

Abstract

Pacific herring (*Clupea pallasi*) in Prince William Sound (PWS) have been classified as "not-recovered" by the Exxon Valdez Oil Spill Trustee Council Predation by marine mammals has been cited as a factor in the failure of this population to rebound We will assess the significance of humpback whale predation on herring in PWS, particularly in winter Specifically we will estimate the number of whales foraging in winter, determine when and if there is a prey switch to herring, and how long whales focus on herring as prey Year one, is stand alone, 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 RECOMMENDATION FUND

Science Director Comments Concur with Science Panel RECOMMENDATION FUND

Executive Director Comments Not yet available

Public Advisory Council Comments Not yet available

Project	**Thorne-Herring Distribution in PWS**
Project Title	Trends in Adult and Juvenile Herring Distribution and Abundance in Prince William Sound
Location	PWS
Principal Investigator	Richard Thorne
Affiliation	PWSSC
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $103,400 FY08 $103,400 FY09 $226,800 FY10 $0

Total Funding Requested

$433,600

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 RECOMMENDATION FUND

Science Director 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 RECOMMENDATION FUND

Executive Director Comments RECOMMENDATION FUND

Public Advisory Council Comments Not yet available

Project	**Thorne/Crawford-Herring Workshop**
Project Title	The Prince William Sound Herring Ecosystem Reconciling Divergent Interpretations for Effective Restoration and Management Applications – An International Scientific Workshop
Location	PWS
Principal Investigator	Richard Thorne, Richard Crawford
Affiliation	PWSSC
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $19,900 FY08 $48,200 FY09 $0 FY10 $0

Total Funding Requested

$68,100

Abstract

Prince William Sound's (PWS) Pacific herring population is classified by the EVOS Trustee Council as "non-recovered" The population prior to the Exxon Valdez Oil Spill was above 100,000 mt, the current population is estimated at 20,000-25,000 mt This proposal's purpose is to follow on the intentions of the April 2006 PWS herring workshop sponsored by EVOS TC In that workshop, local herring experts began scoping PWS herring research needs (EVOS FY 07 Invitation, Appendix A) but did not resolve competing hypotheses for the lack of recovery We propose to assemble a PWS Herring Science Workshop in November 2007 This will include the broadest possible array of scientific expertise on herring to 1) review and synthesize available information on PWS herring, 2) incorporate outside expertise from regional and international clupeid experts, and 3) recommend future PWS herring research and management Funds will be used for planning and implementing the workshop

Science Panel Comments The proposal was well-organized and the PIs qualified to initiate the project However, it is unclear how the workshop suggested in this proposal would advance herring restoration Available herring information has been synthesized in recently funded TC projects, and the April 2006 TC funded workshop brought together experts and community members to exchange information on the current state of herring in the Sound It is unlikely that another workshop of this type will result in consensus regarding the original cause of the herring collapse, nor does the Panel believe it is necessary to come to such a resolution before implementing a recovery program RECOMMENDATION DO NOT FUND

Science Director Concur with Science Panel RECOMMENDATION DO NOT FUND

Executive Director Comments RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Thorne/Frid-Sea Lions and Herring**
Project Title	Modeling Ecological Interactions Between Steller Sea Lions and Pacific Herring
Location	PWS
Principal Investigator	Richard Thorne, Alejandro Frid
Affiliation	PWSSC
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $76,100 FY08 $73,100 FY09 $0 FY10 $0

Total Funding Requested

$149,200

Abstract

The herring population of Prince William Sound is suppressed by predation from Steller sea lions (SSLs) and other predators, including humpback whales and harbor seals Simultaneously, the abundance and distribution of Pacific herring appear to strongly influence energy gain by SSLs, which are listed as threatened under the Endangered Species Act Thus, efforts towards restoring herring and SSL populations should consider ecological games in which both species simultaneously respond to the behavior of each other Previously we used Dynamic State Variable Modeling to investigate interactions between harbor seals and herring in PWS We are currently using this technique to seek insight into how the abundance and distribution of herring affect the behavior and fitness of SSLs Our proposed work would complement that research by 1) developing a comparable model of herring decisions on use of space (e g aggregate in bays vs disperse in main basin) in response to resource distributions and predation pressure from SSLs, and 2) using game theoretic equations to link the SSL and herring models The second objective will be used to predict the simultaneous response of SSLs and herring to each other's behavior under different conditions, and the ensuing consequences to the survival and reproduction of individuals

Science Panel Comments Predation is a concern for PWS herring and the PIs are qualified to conduct this project Although the budget is reasonable for the type of work proposed, it is unclear whether or not this project is redundant with work ongoing at the Prince William Sound Science Center This project would be useful as part of an integrated herring restoration program, but is not an immediate need for herring recovery RECOMMENDATION DO NOT FUND

Science Director Concur with Science Panel RECOMMENDATION DO NOT FUND

Executive Director Comments Concur with Science Panel RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Vollenweider/Heintz-Herring Energetics**
Project Title	Are Herring (Clupea pallasi) Energetics in PWS a Limiting Factor in Successful Recruitment of Juveniles and Reproduction Investment of Adults?
Location	PWS
Principal Investigator	Johanna Vollenweider, Ron Heintz
Affiliation	NOAA
Disbursing Agency	NOAA

Funding Requested by Fiscal Year

FY07 $140,500 FY08 $0 FY09 $0 FY10 $0

Total Funding Requested

$140,500

Abstract

The causes underlying the depressed recruitment rates among PWS herring are unknown, but are likely to include reduced survival of offspring to maturity Potential agents for depressed recruitment include chronic exposure to pathogens and increased numbers of predators While identification of the causative agents remains elusive, it is likely that their combined effects are reflected in herring energy dynamics Previous work in PWS demonstrated the need for juvenile herring to acquire and store energy prior to winter to ensure survival when prey resources were scarce Juveniles facing increased predation risk or immune response may have less surplus energy available to allocate to storage at the onset winter In addition, continuing disease and predation stress may increase the rate at which individuals lose energy during winter Thus decreased offspring survival may result from increased energetic demand over winter Similarly, adults facing increased energy demand as a result of environmental stress are likely to have decreased energy available for reproduction with consequent effects on offspring survival rates Therefore, we propose to examine the energy dynamics of herring in PWS and other locations to test the hypothesis that PWS herring stocks have higher energy consumption rates than healthier stocks in other parts of Alaska

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 RECOMMENDATION FUND

Science Director Concur with Science Panel 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 proposal is one of the few that suggests making these comparisons RECOMMENDATION FUND

Executive Director RECOMMENDATION FUND

Public Advisory Council Comments Not yet available

Project	**Wang/Norcross-Herring Restoration Modeling**
Project Title	Herring Restoration in PWS-Modeling Circulation and Larval Transport
Location	PWS
Principal Investigator	Jia Wang, Brenda Norcross
Affiliation	UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $97,900 FY08 $106,200 FY09 $107,400 FY10 $0

Total Funding Requested

$311,500

Abstract

We propose to investigate the effects of 3-D ocean circulation and zooplankton on the successful transport of larval herring from spawning to nursery grounds We will combine a 3-D coupled Physical-Ecosystem Model (PhEcoM) and a 1-D Larval Herring Growth (LHG) model to investigate the effect of circulation on transport of larval Pacific herring in PWS This 100m resolution, coupled 3-D PhEcoM is forced by tides, freshwater discharge, heat flux, and wind stress derived from NCEP, station data or high-resolution wind products by a regional model The LHG model is affected by the amount of food and the vertical distribution of the food and the larvae Larval herring drift will be simulated by combining the PhEcoM-LHG model and the historical hydrographical conditions and herring spawning locations in PWS to investigate the effect of (1) spawning location and (2) ocean circulation on the potential for a successful year class of juveniles

Science Panel Comments The design and approach of this proposal were well described, and the PI is very well qualified to complete this work The project is relevant to herring enhancement activities It predicts how water circulates within the Sound, which is important to understanding how certain life stages (e g , larvae) get distributed and the location of their deposition Similar work was initiated under the SEA program, but additional information will be added to refine and 'ground truth' the model RECOMMENDATION FUND CONTINGENT

Science Director Comments Not Yet Reviewed

Executive Director Comments Do not fund due to the uncertainty of need for interacting models and applicability to herring restoration RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available

Project	**Weingartner-Oceanographic Monitoring of the Alaska Coastal Current**
Project Title	Long-Term Oceanographic Monitoring of the Alaska Coastal Current
Location	Hydrographic Station GAK 1, Entrance to Resurrection Bay
Principal Investigator	Thomas Weingartner
Affiliation	UAF
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $128,200 FY08 $131,300 FY09 $129,500 FY10 $0

Total Funding Requested

$389,900

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 RECOMMENDATION FUND

Science Director Concur with Science Panel RECOMMENDATION FUND

Executive Director RECOMMENDATION FUND

Public Advisory Council Comments Not yet available

Project	**Wright/Heintz-Salmon Sharks and Herring**
Project Title	Salmon Sharks Preying on Aggregated Herring and Salmon in Prince William Sound
Location	PWS
Principal Investigator	Bruce Wright, Ron Heintz
Affiliation	BAA
Disbursing Agency	TBD

Funding Requested by Fiscal Year

FY07 $287,900 FY08 $75,900 FY09 $75,900 FY10 $0

Total Funding Requested

$439,700

Abstract

Pacific herring populations found in Prince William Sound (PWS) have experienced an extended period of depressed numbers During this same period the salmon shark (*Lamna ditropis*) population has increased in PWS Salmon sharks have been observed at PWS spring herring spawning events Our work on salmon sharks at salmon spawning locations reveals the sharks consuming large numbers of salmon This project will investigate if salmon sharks are also taking large numbers of Pacific herring in PWS We propose to investigate the diets of salmon sharks to determine if they feed on herring, track salmon sharks as they move from herring spawning to salmon spawning events and examine stomach contents to identify the primary energy sources consumed by sharks and confirm these conclusions through fatty acid analysis of shark triacylglycerols

Science Panel Comments Recent work on the diet of salmon sharks has been completed, and information on the quantity of herring consumed as part of their diet has been reported RECOMMENDATION DO NOT FUND

Science Director Comments Concur with Science Panel RECOMMENDATION DO NOT FUND

Executive Director RECOMMENDATION DO NOT FUND

Public Advisory Council Comments Not yet available