PROPOSAL SIGNATURE FORM

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

By submission of this proposal, I agree to abide by the Trustee Council's data policy

(*Trustee Council Data Policy**, adopted July 9, 2002) and reporting requirements

*(Procedures for the Preparation and Distribution of Reports***, adopted July 9, 2002).

PROJECT TITLE: PWS Herring populations: updated synthesis on the causes and lack of recovery

Printed Name of PI: Dr. Stanley D. Rice, NOAA

Signature of PI: _____ Date _____

Printed Name of co-PI: Dr. Terry Quinn, UAF

Signature of co-PI: _____ Date _____

Printed Name of co-PI: Fritz Funk

Signature of co-PI: _____ Date _____

* Available at http://www.evostc.state.ak.us/pdf/admin/datapolicy.pdf
** Available at http://www.evostc.state.ak.us/pdf/admin/reportguidelines.pdf

SFOS 05-193

University of Alaska Fairbanks Proposal

TO: Dr. Richard Dworsky, Science Coordinator
Exxon Valdez Oil Spill Trustee Council
441 West 5th Avenue, Suite 500
Anchorage, AK 99501
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FROM: Fisheries Division
School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
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CONTACT: Grant and Contract Services, PO Box 757880,
109 Administrative Services Center, Fairbanks, AK
99775-7560

TITLE: PWS Herring populations: updated synthesis on the causes and lack of recovery

PRINCIPAL INVESTIGATOR: Terrance Quinn II

NEW/CONTINUATION: New

DURATION: 1 Year

PROPOSED START DATE: May 1, 2005

AMOUNT REQUESTED: $54,623

Terrance Quinn II 4/29/05 /Date
Principal Investigator
907-465-5389
Terry.Quinn@uaf.edu

William W. Smoker /Date
Director
Fisheries Division

Denis Wiesenburg 4/20/05 /Date
Dean
School of Fisheries and Ocean Sciences

for J. Blake 04/21/05 /Date
John Blake
Interim Director
Office of Sponsored Programs

April 2005

Trustee Council Use Only
Project No: 050794
Date Received: __

PROPOSAL SUMMARY PAGE
(To be filled in by proposer)

Project Title:	Prince William Sound Herring: An updated synthesis of the population declines and lack of recovery
Project Period:	May 1, 2005 through September 30, 2006 (FY 05 and fY 06)
Proposer(s):	Stanley Rice, Auke Bay Laboratory, 11305 Glacier Highway, Juneau Ak 99801 jeep.rice@noaa.gov Terry Quinn, UAF Fritz Funk
Project Location:	Synthesis; no field work, but populations from Alaska to California will be used.

Abstract: This project will update the synthesis by Carls et al. (2002), from an oil/herring interaction perspective, but also from the perspective of "uniqueness". Are the PWS herring unique in their population collapse and lack of recovery? This synthesis will conduct comparison population dynamics modeling of PWS and Alaska herring stocks, as well as other stocks throughout the West Coast, including some stressed stocks. Disease information will be updated, and will include 2 years of data not previously published. The synthesis will focus on uniqueness of the PWS herring stocks (or not) relative to oil, disease, recruitment success, and will also examine the ability of the stock to be resilient through genetic diversity. The potential of different restoration or mitigation strategies will be investigated.

Funding:

EVOS Funding Requested: FY 05 $ 101,240.54
FY 06 $ 30,783.56
(must include 9%GA)

TOTAL: $ 132,024.10

Non-EVOS Funds to be Used: FY 05 $

TOTAL: $132,024.10

Date: 14 April 2005

PROJECT PLAN

I. NEED FOR THE PROJECT

A. Statement of Problem

PWS Pacific Herring populations remain depressed, and may be unique in remaining vulnerable to disease and demonstrating a general lack of recovery for the past 15 years. This stock is not behaving in concert with other Alaskan populations. A previous synthesis suggested oil related effects contributed to the poor recruitment of the 1989 year class, and that disease was a major contributing factor to the 1993 stock collapse (Carls et al. 2002). The PWS stock continues to show poor recovery, and continues to be out of sync with other stocks. This synthesis would take a holistic population dynamics modeling approach to see just how unique this population trend is, and to look at possible causes for the continuing trends.

B. Relevance to the RFP

This project will directly examine hypotheses advanced to address the dramatic changes in the size of the Prince William Sound herring stock, and why the stock has not recovered. We will particularly address the question of the underlying variability in the frequency of stock recruitment to assess what role oil might have played in reducing the herring populations in the years following the spill, what factors account for the continued depression of the stocks, and what, if any, restoration strategies would allow the populations to return to historical levels.

II. PROJECT DESIGN

A. Objectives

This project will depend on 5 primary products that will form the foundation of the synthesis (Objectives 1 to 5). We are confident that three of these are publishable in the scientific literature (Obj. 2, 3, 4), and the other three of the other four have a high probability of publication as well. To meet the objectives of the Trustees, a preliminary synthesis will be conducted via a progress meeting in Oct 05 (to review progress and determine preliminary conclusions), and a final meeting about late February 06 to establish and review our final conclusions in preparation of the synthesis.

Organizing Hypothesis: PWS herring are unique in their depressed state and lack of recovery

Phase I: Production of 5 foundation pieces of review

Objective 1.

Review oil effects literature relative to herring and update the previous synthesis (Carls et al. 2002). The new pieces of relevant literature from PWS or other contaminated environments (including laboratory) would be reviewed. The conclusions relative to oil and herring interactions would be reviewed to determine if the conclusion warrant changes.

Lead: Mark Carls

Objective 2.

Update the time series population dynamics analyses of the PWS stock, other comparative Alaskan stocks, and stocks further down the coast. This effort would extend the analyses of Williams and Quinn 2000 a & b with population data up through 2004. Recruitment success, average weight at age, and population trends will be examined, where data are available. This will address the question of just how unique the lack of recruitment is in the PWS stock.

For the preliminary conclusions, due in Oct, only the existing stock data in Alaska would be used (e.g. PWS, Sitka). This would be primarily a temporal extension (update) of the Williams and Quinn papers. For the synthesis, geographical extensions would be attempted where data are available, such as stressed Cherry Point, Washington and San Francisco Bay, California stocks. This would be a valuable contribution to the literature.
Lead: Terry Quinn/ Fritz Funk, with graduate student help

Objective. 3.

Life history approach as causative factors affecting herring recruitment. Data from Norcross and Brown (2001) will be examined, updated, and entered into a sensitivity model. The goal would be to assess the relative contributions of various ecological factors operating at each life stage on herring recruitment in Prince William Sound.
Lead: Contractor (To be determined)/Quinn

Objective 4.

Re-evaluate disease as a limiting factor in herring recruitment in Prince William Sound. This effort would update the Marty et al. 2003 paper that modeled PWS herring population data with disease prevalence through 2000. Additional disease data were gathered through 2002 and stock assessment data are available through 2004, but an updated model has not been published. The significance of VHSV and Ichthyophonus would be discussed. .
Lead: Gary Marty (contract)

Objective 5.

Genetic bottleneck theory evaluation: Because of over fishing in the early 20th century coupled with possible genetic isolation of the PWS stock, PWS herring may exhibit unusually low genetic diversity to cope with the sudden stressors of the oil spill and the subsequent disease challenges. This effort would examine the theory whether this might be the case for PWS herring and would review the information available on genetic diversity in PWS compared to any other stock with genetic information. Is there any support for this theory, or not? If the data are not available, what would it take experimentally to acquire the information?
Lead: Jo Ellen Hose (contract)

Objective 6.

Preliminary conclusions, Oct 2005. Progress on the component parts would be reviewed, along with the various lines of inquiry. Contribution of oil and other factors would be evaluated, through a meeting of the lead researchers.
Lead: Stanley Rice

Objective 7.

Final synthesis, Feb/Mar 2006. In a meeting with the lead researchers, the contributions of various factors would be examined, and final conclusions would be reached. Progress on the 5 foundation objectives will be mostly complete at that time. In addition, an evaluation of restoration strategies and definitions would be conducted, in preparation for the final report.
Lead: Mark Carls

B/C. Procedural, Scientific, and Statistical Methods

Objective 1. A literature search found 8 papers that examined the effects of crude oil on herring that were not available when the initial evaluation of toxicological effects of the Exxon Valdez oil spill on Prince William Sound herring synthesis was published in 2002. Several of these papers were done using Puget Sound stocks of herring. The Carls et al. (2002) paper will be re-evaluated in light of subsequent findings and a summary of the best current scientific information on the effects of the Exxon Valdez oil spill on Prince William Sound herring will be produced. It will directly address the question of whether fluctuations in PWS herring stocks can be attributed either directly or indirectly to oil effects. The synthesis conducted by Pearson et al. 1999 that conflicts with some EVOS papers will be re-evaluated.

Objective 2. Modeling of historical geographical and time series data on PWS and other stocks will be conducted, based in part on the Williams and Quinn (2000a) paper.

Williams and Quinn (2000a) constructed long time series of Pacific herring recruitment and average weight-at-age from the Bering Sea and Northeast Pacific Ocean. The available herring data span seven decades until 1993 and two fishery types. Catch-age composition and weight-at-age from the reduction fishery (for meal and oil) were available from years 1920-1966 for populations in Kodiak, Prince William Sound, and Southeast Alaska (Reid 1971). Inclusion of the reduction fishery data was undertaken to extend the time series backward in time. To obtain recruitment and spawning biomass estimates for the reduction fisheries, the age composition data were analyzed using cohort analysis (Quinn and Deriso 1999).

Modern sac-roe fishery data were used thereafter. Recruitment and spawning biomass estimates were obtained from age-structured analyses constructed by ADF&G and DFO assessment scientists for populations shown in Table 1 (the main herring stocks in Alaska and British Columbia. Recruitment estimates are for age 3 fish for all the populations except for Togiak, which are for age 4 fish. Weight-at-age data span ages 3-8 for each herring population and date back to the 1920's. Individual whole fish weights from the reduction and sac-roe fisheries were sampled during pre- and post-spawning times.

Temporal and spatial relationships of Pacific herring populations were determined through correlation and multivariate analyses. Correlation analysis was used to measure the association between two random variables. Multivariate clustering analyses were used to determine interrelationships of herring populations based on their recruitment and weight-at-age time series. Multidimensional scaling (MDS) was used for dimension reduction of multivariate data. Lastly, a divisive hierarchical clustering method was applied to the Pacific herring data.

In Williams and Quinn (2000b), the historical time series were correlated with environmental data. Candidate models for forecasting herring recruitment were selected by the ordinary and

recent cross-validation prediction errors. Results indicated that forecasting models using air and sea surface temperature data lagged to the year of spawning generally produced the best forecasting models. Multiple environmental variables showed marked improvements in prediction compared single environmental variable models.

We propose to update the study of Williams and Quinn (2000a) in include more recent data from 1994 and later. This should be a straightforward exercise in obtaining recent stock assessment data and finding the time points at which they can be joined to the previously reconstructed series. If there is not a good correspondence for some series, it may be necessary to rerun the cohort analysis to obtain updated historical information. Depending on the consistency of the results, it may be desirable to reexamine the correlations with environmental variables, as in Williams and Quinn (2000b). This will depend on the ease with which environmental time series can be updated.

Secondly we propose to extend the geographic coverage of herring to include populations in BC, Washington and California. This will necessarily involve travel to those areas to meet with assessment scientists, in order to determine if it is feasible to include Cherry Point in Washington and San Francisco Bay in California.

Table 1. Populations of Pacific herring studied in Williams and Quinn (2000a).

NOR	Norton Sound
TOG	Togiak
KOD	Kodiak/Kamishak Bay
PWS	Prince William Sound
SEY	Seymour Canal
SIT	Sitka
SEAK	Southeast
CRG	Craig
KAH	Kah-Shakes
PR	Prince Rupert
QCI	Queen Charlotte Islands
CC	Central Coast
VCI	W. Vancouver Island
SOG	Strait of Georgia

Objective 3

Survival of Pacific herring may be affected at various life history stages. Stages that have been identified as particularly vulnerable are spawning, egg, larvae, juveniles in fall, juveniles over winter, and age -4 spawners. Of these, only the last adult stage is affected by the fisheries. Norcross and Brown (2001) used literature to that date to extract stage-specific estimates of survival of Pacific herring from spawning through age-0 in Prince William Sound (PWS),

Alaska. From those estimates they calculated potential cumulative upper and lower limits of survival through the first year of juvenile life. Cumulating these stage-specific survival estimates yielded a range in survival estimates of 1 – 6,500 juveniles per 1 million eggs, i.e., three orders of magnitude. This compilation identified the late larval and early juvenile stages as having the lowest survival estimates. Furthermore, the wide range of survival estimates for the winter juveniles was related to specific nursery areas.

The Norcross and Brown (2001) review calculated only the extremes of survival at each life stage based on the best and worst case estimates, however any combination of survival estimates for each life stage is possible. Factors that were identified to affect survival of herring are numbers of adults, waves, currents, predation, food, temperature, and disease. Their modeling effort cannot be used to "predict" survival, but it does suggest a mechanism to examine long-term trends in year-class strength. The precision of estimated survival produced by Norcross and Brown (2001) is not meaningful for management, but with refinement could provide estimates of increasing or decreasing trends of herring year classes 2 –3 years before they enter the fishery.

Objective 3 of this proposal is to use the previous life-stage approach with refinements of variability of effects of factors and more sophisticated modeling approaches. These refinements will be examined in a sensitivity model. The sensitivity model will allow the influence of individual factors to be examined separately and in conjunction with other factors. The sensitivity model itself will be a tool to identify the relative strength of influence of each factor on the survival of herring. We also expect the sensitivity model to contribute knowledge about the interaction of factors, e.g., high waves negatively affect survival of eggs and warm winter temperatures negatively affect the over-winter survival of juveniles. The result will not be a predictive model, but it will integrate knowledge gained over the course of previous EVOS-funded research. The results of this assessment will then be included with those from the other objectives of the proposals in the in overall synthesis.

Objective 4. Age-structured assessment of Prince William Sound herring

Quinn et al. (2001) and Marty et al. (2003) developed age-structured assessment models for Prince William Sound that included disease information for modeling survival of adults. Subsequently, ADF&G has used this methodology in its annual assessment of herring in 2004 (S. Moffitt, ADF&G, personal communication). Recent work by Marty and Quinn (assisted by S. Miller, SFOS graduate student) has resulted in the development of age-structured prevalence indices of two disease sources, VHSV and Ichthyophonus, for inclusion into the model. Preliminary results suggest that VHSV has its strongest effect at younger ages (under age 5), while Ichthyophonus has its largest effect on older ages (ages 5 and above). Furthermore, it appears that VHSV played a major role in mortality during 1992-1993 and 1997-1998, but that Ichthyophonus may play a role in keeping the population low during the 2000's.

A standard version of an age-structured assessment model (Quinn and Deriso 1999, section 8.2.5) was modified to evaluate the impact of disease on population abundance. The basic model provides an estimation framework to integrate the various sources of information about Pacific herring in Prince William Sound from 1980 – 2000, including age compositions from the purse-seine fishery and spawning surveys, egg production estimates, and mile-days of milt from aerial surveys (Quinn et al. 2001, Marty et al. 2003). These observations are compared to comparable

model quantities in a least squares setting to obtain parameter estimates of recruitment, abundance, and biomass.

The major assumption is that disease increases the natural mortality M for all adult ages (ages 3 and older), or equivalently, that disease lowers the corresponding natural survival S. For simplicity, S_t in year t is assumed to decrease linearly as a function of disease prevalence variables $\{x_{it}\}$, where natural survival S_0 from sources other than disease is constant.

The age-structured assessment model contains information about the fisheries on PWS herring, which include purse-seine, gillnet, and pound fisheries in the spring (mainly for roe), and a food and bait fishery in the summer and fall. Recruitment occurs at age 3 and there are parameters for recruit abundance, $\{N_{3,t}\}$, for all years (and for all abundances in the first year, 1980). From these parameters and the survival model (1), abundance at each subsequent age and year is estimated.

We propose to use this model as the basis of intuiting the principal factors affecting PWS herring dynamics. Recruitment estimates at age 3 will be related to auxiliary variables related to disease, the environment, and spawning stock. Factors thought to be important in the dynamics will be examined in conjunction with model outputs of abundance and survival for consistency. Finally the model will be perturbed as needed to determine whether particular factors have a major effect on herring population statistics. For example, it is a simple matter to use the model as a simulation framework, in which alternative harvest and recruitment scenarios are developed. An example of a question to be addressed would be: If the fishery had not been reopened for two years in 1997 and 1998, would the population have rebounded more so than what really occurred

Objective 5. Genetic diversity will be examined using available information from Alaska and other west coast stocks. The expectation is that the data available are limited in volume and in comparable methods. Particular attention will be paid to the genetic methods used, as the methods used have recently evolved in the last decade, probably after most of the genetic diversity information has been gathered. If enough data are available, conclusions can be drawn. If data volume and quality are not available, than this sub-project will detail out a scientific plan and cost that it would take so that this concept can be evaluated.

D. Description of Project Area

This is a synthesis with no field work, but the population data used will include most Alaskan stocks and will likely include stocks as far south as San Francisco Bay if the quality of the data are good enough. Stocks to be studies will depend on the available data but will probably include those in Table 1 as well as the Cherry Point stock in Washington and San Francisco Bay stock.

E. Coordination and Collaboration with Other Efforts (If available)

This project is dependent on the coordination and collaboration of an expert team. Dr. Stanley Rice will lead the team as project manager, but will need the contributions of several experts on the work team to accomplish the tasks. Dr. Adam Moles and Mark Carls from ABL will interact with the other experts on oil related issues, track the project, and review portions of the various products.

Drs. Quinn and Funk will lead the modeling efforts. They will rely on the active participation of a graduate student, working under Dr. Quinn's guidance. Dr. Funk will spearhead the acquisition of various data sets with his contacts in Alaska, British Columbia, Washington and California. He will participate in some of the analyses.

Dr. Gary Marty (contract) will have the lead on various disease issues, including the leading of one critical updating paper as one of the four fundamental products.

Dr. Jo Ellen Hose (contract) will have the lead on reviewing genetic data and evaluating the "genetic bottleneck theory" and determining if PWS stock is uniquely narrow in genetic variability.

As we proceed through the various efforts, other collaborators and reviewers may be used. We will have independent peer review, including the invitation of 2-3 outside scientists at two review meetings (one for preliminary conclusions in Oct 05, and in Feb 06).

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Williams, E.H., and Quinn, T.J., II. 2000b. Pacific herring, Clupea pallasi, recruitment in the Bering Sea and Northeast Pacific Ocean: I. Relationships among different populations. Fish. Ocean. 9: 285-299.

III. SCHEDULE

March 25, 2005	RFP issued
April 22, 2005	Proposals due
April 22 - 29, 2005	Peer review, STAC and PAC review conducted
May 2, 2005	Proposal selected and notified
August 2005 - April 2006	Quarterly reports due
October 24, 2005	Semi-annual report and preliminary conclusions
February 20, 2006	Preliminary draft report
March, 2006	Peer Review
1 May, 2006	Final Report

A. Project Milestones

June 1, 2005: All contracts issued

August 2005: Complete initial assessment of data

October 2005: Project team meeting; Complete first cut of data analysis, review progress and problems, and generate preliminary report on conclusions

Feb 1, 2006. Project team meeting; review progress and problems, discuss competing hypotheses, discuss restoration strategies, draft final conclusions.
March 1, 2006. Submit draft final report for review.
May 1, 2006: Complete final report

B. Completion Date
Final Report will be submitted May 1, 2006

Publications and Reports
Final Report

3 Peer-reviewed Manuscripts submitted as part of the final report, will be published.

CURRICULUM VITAE

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EDUCATION

Ph.D., Toxicology and Comparative Physiology, 1971, Kent State University
M.S., Biology, 1968, California State University Chico
B.A., Biology, 1966, California State University Chico

EXPERIENCE

1987-	Program Manager, Habitat and Oil Spill Programs NOAA, AFSC, Auke Bay Laboratory
1971-1986	Physiologist NOAA, AFSC, Auke Bay Laboratory

Over 127 peer reviewed publications; over 100 in toxicology.

Herring Articles

Peterson, C. H., S. D. Rice, J. W. Short, D. Esler, J. L. Bodkin, B. E.Ballachey, and D. B. Irons. 2003. Long-term ecosystem response to the Exxon Valdez oil spill. Science 302: 2082-2086.

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Collaborators: Malin Babcock, Mark Carls, Pat Harris, Ron Heintz, Larry Holland, Marie Larsen, Margo Lindeberg, Jacek Maselko, Jerome Pella and Jeffrey Short: NOAA
Mace Barron (EPA), Brenda Ballachey, James Bodkin, Gail Irvine (USGS), J. Cusick (NPS), David Irons (USFWS) Daniel Esler (Simon Fraser), Gary Marty, Diane Naydan (UC Davis), Charles Peterson (UNC Chapel Hill), Robert Thomas (CSU Chico), William Driskell, Michael Lilly, and James Payne (private contractors)

Curriculum Vitae

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EDUCATION

Ph.D., Biomathematics, 1980, University of Washington, Seattle WA
M.S., Fisheries, 1977, University of Washington, Seattle WA
B.A., Mathematics, 1973, University of Colorado, Boulder CO

EXPERIENCE

1998-	Professor of Fish Population Dynamics, Juneau Center, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks
1985-1997	Associate Professor of Fish Population Dynamics, Juneau Center, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks
1978-1985	Biometrician, International Pacific Halibut Commission

Books

Funk, F., T.J. Quinn II, J. Heifetz, J.N. Ianelli, J.E. Powers, J.F. Schweigert, P.J. Sullivan, and C.-I. Zhang (editors). 1998. Fishery Stock Assessment Models. Proc. Symp. Fishery Stock Assess. Models 21st Cent. Alaska Sea Grant College Program, Fairbanks AK, AK-SG-98-01. 1054 p.

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Williams, E.H., and Quinn, T.J., II. 2000b. Pacific herring, *Clupea pallasi*, recruitment in the Bering Sea and Northeast Pacific Ocean: I. Relationships to environmental variables and implications for forecasting. Fisheries Oceanography 9: 300-315.

050794 – Rice/Quinn Herring synthesis

Collaborators : Ram Myers, Paul Fanning, Robert Mohn, Paul Radomski, Jim Bence, Richard Deriso, Hal Geiger, Clive Turnbull, Vidar Wespestad, Gordon Kruse, John Calambokidis, Chris Gabriele, Jan Straley, Sally Mizroch, Joe Niebauer, Steve Hare, Paul Spencer, Jeremy Collie, Jim Ianelli, Martin Dorn, Anne Hollowed, Richard Marasco, Reg Watson, Fritz Funk, Lewis Haldorson, William Smoker, Gary Marty, John Wilcock, Lev Zhivotovsky, Tony Gharrett, Doug McBride, Peggy Merritt, Richard Gates, Jeff Fujioka, Ben van Alen, Pat Livingston, Graeme Parks, Milo Adkison, Robert Small, Carl Safina, Andy Rosenberg, Steve Moffitt

Students
Bonita Nelson, Jack Turnock, Scott Johnson, Bob Lafferty, Scott MacPherson, Nicole Szarzi, Robert Marshall, Lowell Fair, Daniel Bosch, Edgar Jones, Jon Heifetz, Peter Hagen, Randy Ericksen, Lewis Coggins, Erik Williams, Caihong Fu, Matthew Foster, Dana Hanselman, James Savereide, Brian Battaile, Colin Schmitz, Ben Williams, Briana Witteveen. (Not chaired but significant involvement: Jie Zheng, Mike Sigler,Peggy Merritt, Ed Farley, Chris Rooper, Michio Fukushima, William Templin)

Curriculum Vitae

Frederick C. (Fritz) Funk
Consultant
6017 Sunset Streeet
Juneau AK 99801
Ph. 907-780-4261
E-mail: fritzf@alaska.net
Birthdate: December 31, 1952

EDUCATION

M.S., Fisheries, 1982, University of Washington, Seattle WA
B.A., Zoology, 1975, University of Wisconsin, Madison WI

EXPERIENCE

1980-2003 Statewide Supervisory Herring Biologist
Commercial Fisheries Division, Alaska Dept. of Fish and Game
Juneau, Alaska

Professional Organizations: American Statistical Association
American Fisheries Society (Associate Editor, North American Journal of Fisheries Management (1998-2001)

Research Interests: Fishery stock assessment models and harvest policy, remote sensing applications for fisheries management, Pacific herring biology, ecology and fisheries.

SELECTED PUBLICATIONS

Funk, F. C., L.C. Byrne, and W. Pichel. 2001. Satellite Radar applications to Alaskan crab fisheries. Crabs in Cold Water Regions. 19th Lowell Wakefield Symposium, Alaska Sea Grant, January 17-20, 2001.

Funk, F. J., Blackburn, D. Hay, A.J. Paul, R. Stephenson, R Toreson, and D. Witherell (eds.). Herring: Expectations for a new millennium. University of Alaska Sea Grant, AK-SG-01-04, Fairbanks, Alaska. 800 pp.

Kruse, GH., L.C. Byrne, F.C. Funk, S.C. Matulich, and J. Zheng. 2000. Analysis of minimum size limit for the red king crab fishery in Bristol Bay, Alaska. North American Journal of Fisheries Management 20: 307-319.

Funk, F., T. J. Quinn II, J. Heifetz, J. N. Ianelli, J. E. Powers, J. F. Schweigert, P. J. Sullivan, and C.-I. Zhang. (Eds.) 1998. Fishery Stock Assessment Models. Proceedings of the International Symposium on Fishery Stock Assessment Models for the 21st Century. Alaska Sea Grant Program Report No. 98-01. University of Alaska, Fairbanks. 1037 pp.

Funk, F. and K. A. Rowell. 1996. Population model suggests new threshold for managing Alaska's Togiak fishery for Pacific herring in Bristol Bay. Alaska Fishery Research Bulletin 2(2):125-136.

Funk, F., G.A. Borstad, and S.A. Akenhead. 1995. Imaging spectrometer detects and measures the surface area of Pacific herring schools in the Bering Sea. Pp 833-843 in: Proceedings of the third thematic conference on remote sensing for marine and coastal environments, 18-20 Sept. 1995, Seattle, Vol. II. Environmental Research Institute of Michigan, Ann Arbor.

Zheng, J., F.C. Funk, G.H. Kruse, and R. Fagen. 1993. Evaluation of threshold managment strategies for Pacific herring in Alaska. p 141-166 in: G. Kruse, D.M. Eggers, R. J. Marasco, C. Pautzke, and T.J. Quinn II (eds.): Proceedings of the International Symposium on Management Strategies for Exploited Fish Populations. Alaska Sea Grant College Program Report No. 92-02, University of Alaska, Fairbanks.

050794 – Rice/Quinn Herring synthesis

Curriculum Vitae

Mark G. Carls
National Marine Fisheries Service, Auke Bay Laboratory email: **mark.carls@noaa.gov**
11305 Glacier Highway Phone: (907) 789-6019
Juneau, AK 99801 FAX: (907) 789-6094

Education
M.Sc., 1978, biological oceanography, Dalhousie University, Halifax, Nova Scotia.
B.A., 1975, biology, Gustavus Adolphus College, St. Peter, Minnesota.

Professional Experience
Fisheries Biologist, 1979-present, Auke Bay Laboratory.
Principal Investigator for Exxon Valdez Oil Spill Trustee Council
- Pink salmon habitat & toxicity
- Herring Synthesis
- Mussel Beds
- Herring toxicity & field research

Served as a member of a Biological Review Team; status of Pacific herring in Puget Sound, Washington.

Recent Publications (lead author only)
Carls, M.G., S.D. Rice, G.D. Marty, and D.K. Naydan. 2004. Pink salmon spawning habitat is recovering a decade after the *Exxon Valdez* oil spill. Trans Am Fish Soc 133:834-844.

Carls MG, Thedinga JF, Thomas RE. 2004. Observer classification of live, mechanically damaged, and dead pink salmon eggs. Trans Am Fish Soc 133:245-251.

Carls, M.G., L.G. Holland, J.W. Short, R. A. Heintz, and S. D. Rice. 2004. Monitoring polynuclear aromatic hydrocarbons in aqueous environments with passive low-density polyethylene membrane devices. Environ Toxicol Chem 23:1416-1424.

Carls, M.G., Thomas, R.E. Rice, S.D. 2003. Mechanism for transport of oil-contaminated water into pink salmon redds. Mar. Ecol. Prog. Ser. 248:245-255.

Carls, M.G., G.D. Marty, J.E. Hose. 2002. Synthesis of the toxicological impacts of the *Exxon Valdez* oil spill on Pacific herring (*Clupea pallasi*) in Prince William Sound, Alaska, U.S.A. Can. J. Fish. Aquat. Sci. 59:1-20.

Carls, M.G., M.M. Babcock, P.M. Harris, G.V. Irvine, J.A. Cusick, and S.D. Rice. 2001. Persistence of Oiling in Mussel Beds after the *Exxon Valdez* Oil Spill. Marine Environmental Research 51:167-190.

Carls, M. G., J. E. Hose, R. E. Thomas, and S.D. Rice. 2000. Exposure of Pacific herring to weathered crude oil: assessing effects on ova. Environ. Toxicol. Chem. 19:1649-1659.

Carls, M. G., S. D. Rice, and J. E. Hose. 1999. Sensitivity of fish embryos to weathered crude oil: Part 1. Low level exposure during incubation causes malformations and genetic damage in larval Pacific herring (*Clupea pallasi*). Environmental Toxicology and Chemistry 18:481-493

Other Personnel:

Dr. Gary Marty of the University of California Davis has been the leading pathologist examining the role of VHS virus on Prince William Sound herring, culminating in the publication of Marty et al. (2003) "Role of disease in abundance of a Pacific herring (Clupea pallasi) population" in the Canadian Journal of Fisheries and Aquatic Sciences. Dr. Marty has authored or coauthored 12 other papers on diseases in Pacific herring, primarily in relation to the Exxon Valdez oil spill and Prince William Sound. He is a board-certified veterinary pathologist, and a licensed veterinarian with the State of Alaska.

Herring Papers

Marty, G. D., Quinn, T. J.,II, Carpenter, G., Meyers, T. R., & Willits, N. H. (2003). Role of disease in abundance of a Pacific herring (*Clupea pallasi*) population. *Canadian Journal of Fisheries and Aquatic Sciences, 60*(10): 1258-1265.

Carls, M. G., Marty, G. D., & Hose, J. E. (2002). Synthesis of the toxicological impacts of the Exxon Valdez oil spill on Pacific herring (*Clupea pallasi*) in Prince William Sound, Alaska, U.S.A. *Canadian Journal of Fisheries and Aquatic Sciences, 59*(1): 153-172.

Hershberger, P. K., Kocan, R. M., Elder, N. E., Marty, G. D., & Johnson, J. (2001). Management of Pacific herring spawn-on-kelp fisheries to optimize fish health and product quality. *North American Journal of Fisheries Management, 21*(4): 976-981

Marty, G. D., Okihiro, M. S., Brown, E. D., Hanes, D., & Hinton, D. E. (1999). Histopathology of adult Pacific herring in Prince William Sound, Alaska, after the Exxon Valdez oil spill. *Can.J.Fish.Aquat.Sci./J.Can.Sci.Halieut.Aquat, 56*(3): 419-426

Davis, C. R., Marty, G. D., Adkison, M. A., Freiberg, E. F., & Hedrick, R. P. (1999). Association of plasma IgM with body size, histopathologic changes, and plasma chemistries in adult Pacific herring Clupea pallasi. *Diseases of aquatic organisms, 38*(2): 125-133

Carls, M. G., Marty, G. D., Meyers, T. R., Thomas, S. J., & Rice, S. D. (1998). Expression of viral hemorrhagic septicemia virus in prespawning Pacific herring (*Clupea pallasi*) exposed to weathered crude oil. *Canadian Journal of Fisheries and Aquatic Sciences, 55*(10): 2300-2309

Marty, G. D., Freiburg, E. F., Meyers, T. R., Wilcock, J., Farver, T. B., & Hinton, D. E. (1998). Viral hemorrhagic septicemia virus, *Ichthyophonus hoferi*, and other causes of morbidity in Pacific herring *Clupea pallasi* spawning in Prince William Sound, Alaska, USA. *Diseases of AquaticOrganisms, 32*(1:, 15-40.

Marty, G. D., Hose, J. E., Mcgurk, M. D., Brown, E. D., & Hinton, D. E. (1997). Histopathology and cytogenetic evaluation of Pacific herring larvae exposed to petroleum hydrocarbons in the laboratory or in Prince William Sound, Alaska, after the Exxon Valdez oil spill. *Canadian Journal of Fisheries and Aquatic Sciences 54*(8): 1846-1857.

Hose, J. E., McGurk, M. D., Marty, G. D., Hinton, D. E., Brown, E. D., & Baker, T. T. (1996). Sublethal effects of the Exxon Valdez oil spill on herring embryos and larvae: Morphological, cytogenic, and histopathological assessments, 1989-1991. *Canadian Journal of Fisheries and Aquatic Sciences53:* 2355-2365.

Kocan, R. M., Marty, G. D., Okihiro, M. S., Brown, E. D., & Baker, T. T. (1996). Reproductive success and histopathology of individual Prince William Sound Pacific herring 3 years after the Exxon Valdez oil spill. *Canadian Journal of Fisheries and Aquatic Sciences 53*(10): 2388-2393. .

050794 – Rice/Quinn Herring synthesis

Dr. Jo Ellen Hose at Occidental University, California, is a world expert in genetics and has considerable experience with Pacific herring. Research and consulting experience includes affiliation with the Alaska Department of Fish and Game (sublethal effects of the Exxon Valdez oil spill on fish), Lawrence Berkeley Laboratory (biological toxicity evaluation of San Francisco Bay, genetic effects of ozone depletion in Antarctica), National Oceanic and Atmospheric Administration (effects of the Exxon Valdez oil spill on Pacific herring, reproductive impairment of southern California fish, and evaluation of genotoxicity measurements), National Science Foundation (crustacean physiology and immunology) and Southern California Edison (biological effects of power plant discharges). Her research interests include aquatic toxicology, pollution impacts to wetlands and marine environments, genotoxicity methods development, and pathology and physiology of marine organisms. Dr. Jo Ellen has published 53 papers, including 9 specific to Pacific herring and crude oil (1996 to 2002).

Herring Papers

Carls, M. G., Marty, G. D., & Hose, J. E. (2002). Synthesis of the toxicological impacts of the exxon valdez oil spill on Pacific herring (Clupea pallasi) in Prince William Sound, Alaska, U.S.A. *Canadian Journal of Fisheries and Aquatic Sciences, 59*(1), 153-172.

Carls, M. G., Hose, J. E., Thomas, R. E., & Rice, S. D. (2000). Exposure of Pacific herring to weathered crude oil: Assessing effects on ova. *Environmental Toxicology and Chemistry, 19*(6), 1649-1659.

Carls, M. G., Rice, S. D., & Hose, J. E. (1999). Sensitivity of fish embryos to weathered crude oil: Part I. low-level exposure during incubation causes malformations, genetic damage, and mortality in larval Pacific herring (Clupea pallasi). *Environmental Toxicology and Chemistry, 18*(3), 481-493.

Hose, J. E., & Brown, E. D. (1998). Field applications of the piscine anaphase aberration test: Lessons from the Exxon Valdez oil spill. *Mutation research, 399*(2), 167-178.

Marty, G. D., Hose, J. E., Mcgurk, M. D., Brown, E. D., & Hinton, D. E. (1997). Histopathology and cytogenetic evaluation of Pacific herring larvae exposed to petroleum hydrocarbons in the laboratory or in Prince William Sound, Alaska, after the Exxon Valdez oil spill. *Canadian Journal of Fisheries and Aquatic Science 54*(8), 1846-1857.

Brown, E., Baker, T., Hose, J., Kocan, R., Marty, G., & McGurk, M. et al. (1996). In Rice S. D., Spies R. B., Wolfe D. A. and Wright B. A.(Eds.), *Injury to the early life history stages of Pacific herring inPrince William Sound after the ExxonValdez oil spill.*American Fisheries Society Symposium 18: 448-462.

Hose, J. E., Mcgurk, M. D., Marty, G. D., Hinton, D. E., Brown, E. D., & Baker, T. T. (1996). Sublethal effects of the Exxon Valdez oil spill on herring embryos and larvae: Morphological, cytogenic, and histopathological assessments, 1989-1991. *Canadian Journal of Fisheries and Aquatic Science, 53*(10), 2355-2365.

Kocan, R. M., Hose, J. E., Brown, E. D., & Baker, T. T. (1996). Pacific herring (Clupea pallasi) embryo sensitivity to Prudhoe Bay petroleum hydrocarbons: Laboratory evaluation and in situ exposure at oiled and unoiled sites in Prince William Sound. *Canadian Journal of Fisheries and Aquatic Sciences 53*(10), 2366-2375.

Norcross, B. L., Hose, J. E., Frandsen, M., & Brown, E. D. (1996). Distribution, abundance, morphological condition, and cytogenetic abnormalities of larval herring in Prince William Sound, Alaska, following the Exxon Valdez oil spill. *Canadian Journal of Fisheries and Aquatic Sciences 53*(10), 2376-2387

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IV. RESPONSIVENESS TO KEY TRUSTEE COUNCIL STRATEGIES

A. Community Involvement and Traditional Ecological Knowledge (TEK)

Briefings to communities can be provided if invited.

B. Resource Management Applications

Resource managers in the State of Alaska, as well as other managers with distressed populations , will likely find the modeling comparisons of recruitment success over time for west coast populations of interest. The discussion on restoration strategies may also have significant management applications. The Principal Investigators have direct access to these managers.

V. PUBLICATIONS AND REPORTS

We expect a minimum of three of the foundation objectives to be published in peer reviewed publications.

Marty. G.D., S. Miller, T.J. Quinn II, and S.D. Moffitt. Effect of Ichthyophonus hoferi on population biomass of Pacific herring in Prince William Sound, Alaska. Can. J. Fish. Aquat. Sci.

Quinn, T.J., F.C. Funk, G.D. Marty, J.E. Hose, M.G. Carls, and S.D.Rice. Are Prince William Sound herring unique in their depressed state and lack of recovery?

Quinn, T.J., II, and F.C. Funk. Pacific herring, *Clupea pallasi*, recruitment in the Northeast Pacific Ocean: inter-relations of environmental variables and populations. .

Rice, S.D., M.G. Carls, F.C. Funk and T.J. Quinn. Are Prince William Sound herring (Clupea pallasi) still affected by the Exxon Valdez oil spill?

VI. BUDGET JUSTIFICATION

Addressing issues of population dynamics and modeling, life history, toxicology, and genetics of Prince William Sound herring at the level requested in the RFP has meant assembling a team of experts. There are several institutions or individuals who could submit a synthesis that would address Trustee concerns but would lack the rigor and comprehensiveness of the synthesis this team of world experts will create. To do the extensive modeling required, we needed an expert (Quinn), and he needed a graduate student. The justification of these particular costs are attached below. The rest of the costs are mostly on the contracts for the additional experts, and for the travel to get 2 of the team members to Juneau for two meetings. We require the two meetings in Juneau in order to meet the deadline in the RFP for the Preliminary conclusions. The only practical way to accomplish that specific task is to have a joint meeting, review the progress and come to consensus on the preliminary conclusions. The second trip will be be needed to discuss and arrive at final conclusions, particularly the discussions about restorations strategies, and if any would affect any of the component parts of the synthesis. Travel costs include attendance at the annual EVOS Symposium to present the results (your requirement). In addition, we are anticipating that one trip to acquire data from Washington and California stocks will be needed. The addition of these stocks to the west coast may be particularly revealing as each of these states has stressed stocks, along with other stocks that are not. At this time, we do not know the quality of their data and if it can be used. We will need to get our experts (Quinn or Funk) together with the specific biologists/biometricians in those areas, and we expect that one trip will be the most efficient way to quality assure the data to see if it is worth using in our teams models.

UAF Budget Specifics

This proposal is a collaborative effort between Auke Bay Lab, UAF-SFOS, Fritz Funk, and other herring researchers to provide a synthesis of existing information about Prince William Sound herring and the factors contributing to its lack of recovery. As detailed in the attached proposal, Quinn and his graduate student will have primary responsibility for Task 2 (updating an analysis by Quinn's former graduate student Erik Williams). The UAF portion of the budget will be a subcontract through an RSA transferred from Auke Bay Lab. The budget includes 1 month of funding for Quinn, 1 year of stipend, tuition, and a computer for the graduate student, and travel to EVOS annual meeting, as required by the RFP. Minimal project supply costs are included, as well as cost of computer repair/upgrades.

For each budget category (personnel, travel, contractual, commodities and equipment), this section lists the total amount requested.

Personnel:
Quinn, T., 1.00 month (174 hours per month). Hrly rate: $51.55. Hrly rate * Leave rate of 1.1%= $9,068
B. Other Personnel: MS grad student. 8 months (87 hours per month) at $12.90 hr. Leave rate of 0.0%=$8,978. MS Grad Student in summer (4 months, 174 hours per month). Hrly rate=$12.90. Leave rate of 0.0%= 0.0%= $8,978. total=$17,956
Total Salaries and Wages= $27,024.
Fringe Benefits. Faculty Benefits of 35.5%=$3,219.Grad Student Benefits (summer only) of 8.7%=$781
Total Fringe Benefits= $4,000. Total Salaries and Benefits=$31,024

Travel
Domestic to EVOS annual symposium (R/T Juneau to Anchorage). airfare: $300.00. 3 days lodging $95; per diem 3 days $40=$405
Total Travel= $705
Other/Contractual/Services. Computer repair costs associated with proper upgrades/maintenance of laptop computer=$500
Commodities. Laptop computer: $2,000.
Project-related supplies (field, lab, project related materials necessary for completion of project: $500
Total Commodities: $2,500
Other costs also includes: Out-Of-State Tuition: $8,969.

Total Direct Costs. $43,698
Base: $43,698
Total Indirect Costs (F&A). EVOS TDC. Current Rate: 25.0%= $10,925.
Total Direct & Indirect: $54,623

CURRENT AND PENDING SUPPORT FORM

Any current and pending financial resources that are intended to support research related or similar to that included in the proposal, or that would consume the time of the proposer(s), must be identified for each principal investigator and other senior personnel involved in the proposal.

The following information must be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Dr. Stanley Rice	Other agencies to which this proposal has been/will be submitted: None

Support: X☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Lingering Project 3620

Source of Support: Exxon Valdez Trustee Council

Total Award Amount: $150,000 Total Award Period Covered: FY04-06

Location of Project: Prince William Sound

Months of Your Time Committed to the Project: 0 FY05: Sumr:

Support: X☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Program Manager, NOAA

Source of Support: United States Government

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Months of Your Time Committed to the Project: FY05: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Months of Your Time Committed to the Project: FY05: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Months of Your Time Committed to the Project: FY05: Sumr:

*If this project has previously been funded by another entity, please list and furnish information for immediately preceding funding period.

CURRENT AND PENDING SUPPORT FORM

The following information must be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator:	Other agencies to which this proposal has been/will be submitted:
Terrance Quinn	None

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:
Deployment of an Acoustic data logger on Commercial Fishing Vessels to Evaluate the Potential of Fishing-Induced declines in Local Pollock Abundance

SFOS 05-056R, S1643, G1611
Source of Support: PCCRC
Total Award Amount: $117,512 Total Award Period Covered: 01-MAR-2004 to 28-FEB-2006
Location of Project: Alaska
Months of Your Time Committed to 0.00 1.00 FY 0.00 FY Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:
Multi Species Assessment Models for Fisheries Management

SFOS 03-213R2, S4173, G0460
Source of Support: Alaska Sea Grant College Program
Total Award Amount: $60,793 Total Award Period Covered: 01-FEB-2004 to 31-JAN-2006
Location of Project: Alaska
Months of Your Time Committed to 0.00 1.00 FY 1.00 FY Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:
University of Alaska Fairbanks Graduate Student Stipend for Stock Assessment Training and Improvement

SFOS 02-232R2, S4472, G0191
Source of Support: CIFAR
Total Award Amount: $190,500 Total Award Period Covered: 01-JUL-2003 to 30-JUN-2006
Location of Project: Alaska
Months of Your Time Committed to 0.00 0.00 FY 0.00 FY Sumr:

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:
Feasibility of estimating movement within a spatially-explicit stock assessment model of eastern Bering Sea walleye pollock

SFOS 05-084, S6185
Source of Support: NPRB
Total Award Amount: $60,589 Total Award Period Covered: 01-MAY-2005 to 30-APR-2006
Location of Project: Alaska
Months of Your Time Committed to 0.00 0.86 FY 0.00 FY Sumr:

*If this project has previously been funded by another entity, please list and furnish information for immediately preceding funding period.

CURRENT AND PENDING SUPPORT FORM

The following information must be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator:	Other agencies to which this proposal has been/will be submitted:
Terrance Quinn	None

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Subcontract to Iowa State University fishery management and stock assessment issues SFOS 05-154, S6508

Source of Support: Iowa State University

Total Award Amount: $29,038 Total Award Period Covered: 01-JAN-2006 to 31-DEC-2007

Location of Project: Alaska

Months of Your Time Committed to the Project: 0.00 0.75 FY 0.75 FY Sumr:

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Assessment of the Southeast Alaska Geoduck (Panopea abrupta) Survey Methodolgies SFOS 05-158, S6520

Source of Support: ADFG

Total Award Amount: $20,000 Total Award Period Covered: 15-MAR-2005 to 15-OCT-2005

Location of Project: Alaska

Months of Your Time Committed to the Project: 0.00 0.00 FY 0.00 FY Sumr:

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Field Evaluation of Geoduck (Panopea Abrupta) Survey Methodology and Community Effects of Geoduck Fishing in Southeast Alaska SFOS 05-172, S6593

Source of Support: Alaska Sea Grant College Program

Total Award Amount: $145,637 Total Award Period Covered: 01-FEB-2006 to 31-JAN-2008

Location of Project: Alaska

Months of Your Time Committed to the Project: 0.00 0.10 FY 0.10 FY Sumr:

*If this project has previously been funded by another entity, please list and furnish information for immediately preceding funding period.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Multispecies Fisheries Models for Ecosystem Decision Support SFOS 05-168, S6595

Source of Support: Alaska Sea Grant College Program

Total Award Amount: $138,672 Total Award Period Covered: 01-FEB-2006 to 31-JAN-2008

Location of Project: Alaska
Months of Your Time Committed to the Project: 0.00 1.00 FY 1.00 FY Sumr:

*If this project has previously been funded by another entity, please list and furnish information for immediately preceding funding period.

CURRENT AND PENDING SUPPORT FORM

The following information must be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator:
Terrance Quinn

Other agencies to which this proposal has been/will be

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:
PWS Herring populations: updated synthesis on the causes and lack of recovery SFOS 05-193

THIS PROPOSAL
Source of Support: NOAA, NMFS, Auke Bay (EVOS)
Total Award Amount: $54,623 Total Award Period Covered: May1, 2005 to September 30,
Location of Project: Alaska
1.0 FY 07 FY 08 Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Months of Your Time Committed to FY 07 FY 08 Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Months of Your Time Committed to FY 07 FY 08 Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:

Months of Your Time Committed to	FY 07	FY 08	Sumr:

*If this project has previously been funded by another entity, please list and furnish information for immediately preceding funding period.

CURRENT AND PENDING SUPPORT FORM

The following information must be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Frederick Funk	Other agencies to which this proposal has been/will be: None

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Biometrician (part-time)

Source of Support: Alaska Department of Fish and Game
Total Award Amount: Total Award Period Covered:
Location of Project:
Months of Your Time Committed to the FY05: Sumr:

Support: X☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Months of Your Time Committed to the FY05: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Months of Your Time Committed to the FY05: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Months of Your Time Committed to the FY05: Sumr:

*If this project has previously been funded by another entity, please list and furnish information for immediately preceding funding period.

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2004 - September 30, 2005

Budget Category:	Proposed FY 2005	Proposed FY 2006	PROPOSED FY 2005 TRUSTEE AGENCIES TOTALS					
			ADEC	ADF&G	ADNR	USFS	DOI	NOAA
				$28,755.54				$72,485.00
Personnel	11,058.30	$1,228.20						
Travel	12,500.00	$705.00						
Contractual	54,562.18	$15,675.74						
Commodities	9,484.50	$4,984.50						
Equipment	0.00	$0.00	PROPOSED FY 2006 TRUSTEE AGENCIES TOTALS					
Indirect UAF 25%	5,276.25	$5,648.36						
Subtotal	92,881.23	$28,241.80		ADF&G				NOAA
General Administration	8,359.31	$2,541.76		$30,783.56				$0.00
Project Total	101,240.54	$30,783.56						
Full-time Equivalents (FTE)	0.0	0.1						
Other Resources	$0.0	$0.0				$0.0		

Comments:

Total Project Cost (FY05 + FY06) = $132,024.10

FY05

Prepared:

Project Number:050794
Project Title: Herring Synthesis
PI: Rice/Quinn
Lead Agency: NOAA/ NMFS Auke Bay Lab/ADFG

FORM 2A
MULTI-TRUSTEE
AGENCY
SUMMARY

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

Budget Category:	Authorized FY 2004	Proposed FY 2005	LONG RANGE FUNDING REQUIREMENTS					
Personnel		$0.00						
Travel		$12,500.00						
Contractual		$51,000.00						
Commodities		$3,000.00						
Equipment		$0.00						
Subtotal	$0.0	$66,500.00						
General Administration		$5,985.00						
Project Total	$0.0	$72,485.00						
Full-time Equivalents (FTE)		0.0						
Other Resources								

Comments:
NOAA in kind services:
M. Carls = 1 month
A. Moles = 1 month
J. Rice = 1 month

FY05

Project Number: 050794
Project Title: Herring Synthesis
PI: Rice
Agency: NOAA/ NMFS Auke Bay Laboratory

FORM 3A
TRUSTEE
AGENCY
SUMMARY

Prepared:
Rice_050794_FY05-06_Budget.xls

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

Personnel Costs:		GS/Range/	Months	Monthly		Proposed
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2006
						0.0
Jeep Rice	Principal Investigator	GS-14				0.0
						0.0
Mark Carls	Fish. Research Biologist	GS-12				0.0
						0.0
Adam Moles	Fish. Research Biologist	GS-13				0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:			Ticket	Round	Total	Daily	Proposed
Description			Price	Trips	Days	Per Diem	FY 2006
Rice	JNU-ANC	2006 EVO Annual Workshop	600.00	1	4	100.00	1,000.00
							0.00
Marty	British Columbia -JNU	(workshops)	1500.00	2	5	200.00	4,000.00
							0.00
Funk	JNU-ANC	2006 EVO Annual Workshop	600.00	1	4	100.00	1,000.00
							0.00
J. Hose	CA-JNU	(workshops)	1500.00	2	5	200.00	4,000.00
							0.00
unnamed	JNU-CA	(review data)	1500.00	1	5	200.00	2,500.00
							0.00
							0.00
							0.00
						Travel Total	12,500.00

FY05

Project Number: 050794
Project Title: Herring Synthesis
PI: Rice
Agency: NOAA/ NMFS Auke Bay Laboratory

FORM 3B
Personnel
& Travel
DETAIL

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2004 - September 30, 2005

Contractual Costs:		Proposed
Description		FY 2006
Gary D. Marty - Report (UC Davis) [objective 4]		8,000.00
JoEllen Hose - Report (Oxidental Univ., CA) [objective 5]		8,000.00
Fritz C. Funk - Report (private contract) [objective 2]	Co- Principal Investigator	10,000.00
Unnamed contract - analysis and report (private contract) [objective 3]		10,000.00
noaa contract labor [support for objective 1]		15,000.00
When a non-trustee organization is used, the form 4A is required.	**Contractual Total**	51,000.00

Commodities Costs:	Proposed
Description	FY 2006
Publication costs: $1K per publication; 3 publications	3,000.00
Commodities Total	3,000.00

FY05

Prepared:

Project Number: 050794
Project Title: Herring Synthesis
PI: Rice
Agency: NOAA/ NMFS Auke Bay Laboratory

FORM 3B
Contractual &
Commodities
DETAIL

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

New Equipment Purchases:	Number of Units	Unit Price	Proposed FY 2006
Description			
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.	**New Equipment Total**		$0.0

Existing Equipment Usage:	Number of Units	Inventory Agency
Description		

FY05-06

Prepared:

Project Number: 050794
Project Title: Herring Synthesis
PI: Rice
Agency: NOAA/ NMFS Auke Bay Laboratory

FORM 3B
Equipment
DETAIL

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

Budget Category:	Proposed FY 2005	Proposed FY 2006	LONG RANGE FUNDING REQUIREMENTS					
Personnel	11,058.30	1,228.20						
Travel	0.00	705.00						
Contractual	3,562.18	15,675.74						
Commodities	6,484.50	4,984.50						
Equipment	0.00	0.00						
Subtotal	21,104.98	22,593.44						
Indirect (UAF 25%)	5,276.25	5,648.36						
Project Subtotal	26,381.23	28,241.80						
Agency GA	2,374.31	2,541.76						
Project Total	28,755.54	30,783.56						
FTE	0.0	0.1						
Other Resources								

Comments:
Total GA = ADF&G (9%)+ UAF (25%)

FY05

Project Number: 050794
Project Title: Herring Synthesis
PI: Quinn
Agency: ADF&G - UAF/IMS

FORM 3A
TRUSTEE
AGENCY
SUMMARY

Prepared:
Rice_050794_FY05-06_Budget.xls

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2004 - September 30, 2005

Personnel Costs:		GS/Range/ Step	Months Budgeted	Monthly Costs	Overtime	Proposed FY 2005
Name	Position Description					
T. Quinn	Principal Investigator					0.00
Hourly Rate	$51.55 (174 hrs/mo)		0.9			11,058.30
Leave Rate	1%					0.00
Benfit Rate	35.50%					0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
	Subtotal		0.9	0.0	0.0	
					Personnel Total	11,058.30

Travel Costs:	Ticket Price	Round Trips	Total Days	Daily Per Diem	Proposed FY 2006
Description					
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
				Travel Total	0.00

FY05

Project Number: 050794
Project Title: Herring Synthesis
PI: Quinn
Agency: ADF&G - UAF/IMS

FORM 3B
Personnel
& Travel
DETAIL

Prepared:
Rice_050794_FY05-06_Budget.xls

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

Contractual Costs:					Proposed FY 2005
Description					
MS grad students					
Wages	$12.90/hr	87 hrs/mo	3 mos		3,562.18
Leave Rate		0			
Benefit Rate		0			
When a non-trustee organization is used, the form 4A is required.				**Contractual Total**	3,562.18

Commodities Costs:	Proposed FY 2005
Description	
1 laptop computer	2,000.00
Out of state Tuition	4,484.50
Commodities Total	6,484.50

FY05

Project Number: 050794
Project Title: Herring Synthesis
PI: Quinn
Agency: ADF&G - UAF/IMS

FORM 3B
Contractual & Commodities DETAIL

Prepared:
Rice_050794_FY05-06_Budget.xls

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2004 - September 30, 2005

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2005
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY05

Project Number: 050794
Project Title: Herring Synthesis
PI: Quinn
Agency: ADF&G - UAF/IMS

FORM 3B
Equipment
DETAIL

Prepared:
Rice_050794_FY05-06_Budget.xls

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

Personnel Costs:			GS/Range/	Months	Monthly		Proposed
Name		Position Description	Step	Budgeted	Costs	Overtime	FY 2006
T. Quinn		Principal Investigator					0.00
	Hourly Rate	$51.55 (174 hrs/mo)		0.1			1,228.20
	Leave Rate	1%					0.00
	Benfit Rate	35.50%					0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
		Subtotal		0.1	0.0	0.0	
						Personnel Total	1,228.20

Travel Costs:			Ticket	Round	Total	Daily	Proposed
Description			Price	Trips	Days	Per Diem	FY 2006
							0.00
T. Quinn	JNU-ANC	2006 EVO Annual Workshop	405.0	1	3	100.0	705.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
						Travel Total	705.00

FY06

Project Number: 050794
Project Title: Herring Synthesis
PI: Quinn
Agency: ADF&G - UAF/IMS

FORM 3B
Personnel
& Travel
DETAIL

Prepared:
Rice_050794_FY05-06_Budget.xls

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

Contractual Costs:					Proposed
Description					FY 2006
MS grad students					
Wages	$12.90/hr	174 hrs/mo	9mos		15,175.74
Leave Rate		0			
Benefit Rate 8.7%					
computer repair					500.00
When a non-trustee organization is used, the form 4A is required.				**Contractual Total**	15,675.74

Commodities Costs:	Proposed
Description	FY 2006
project related supplies	500.00
Out of state Tuition	4,484.50
Commodities Total	4,984.50

FY06

Project Number: 050794
Project Title: Herring Synthesis
PI: Quinn
Agency: ADF&G - UAF/IMS

FORM 3B
Contractual &
Commodities
DETAIL

Prepared:
Rice_050794_FY05-06_Budget.xls

2005 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET
October 1, 2004 - September 30, 2005

New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2006
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by placement of an R.		**New Equipment Total**	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY06

Project Number: 050794
Project Title: Herring Synthesis
PI: Quinn
Agency: ADF&G - UAF/IMS

FORM 3B
Equipment
DETAIL

Prepared:
Rice_050794_FY05-06_Budget.xls