

A synthesis of the ecological findings from the EVOS Damage Assessment and Restoration Programs, 1989-2001

Project Number: 02600

Restoration Category: Monitoring, Research

Proposer: Robert B. Spies, EVOS Chief Scientist, and collaborators

Lead Trustee Agency: Not known

Cooperating agencies: None

Alaska SeaLife Center: No

Duration: 1st year, 2 year project

Cost FY 02: \$141.7K

Cost FY 03: \$289.1

Geographic Area: No field work

Injured Resource/Service: All resources

ABSTRACT

This project will synthesize the significant results from 12 years of post-spill study in the EVOS damage assessment and restoration programs as they relate to anthropogenic and natural forcing factors influencing the northern Gulf of Alaska ecosystem. The results of the work will be incorporated into a series of interrelated manuscripts that will be submitted for publication as an integrated synthesis in book form. This effort will be one of the major products of the EVOS restoration program and help set the foundation for the Gulf Ecosystem Monitoring Program.

Introduction

The effort being proposed is a synthesis of the main scientific findings from the EVOS Restoration Program, with an emphasis on what new has been learned about the affected ecosystem, particularly the variability in this ecosystem in

response to the spill and to natural factors. It will be based on the products of the scientific studies following the spill and will cover the period of 1989 to 2001, with reference of course to literature covering earlier ecosystem responses. Publications, final reports and data from this effort will be evaluated to determine what can be learned about human and natural forcing factors in the ecosystem.

Need for the Project

A. *Statement of the problem*--The proposed long-term monitoring and research program for the northern Gulf of Alaska (GEM) is best put in place on a solid foundation from previous intensive work in the ecosystem affected by the *Exxon Valdez* Oil Spill. With over 300 separate research projects that studied virtually all major components in the ecosystem over 12 years, with many simultaneous studies that potentially captured large-scale variability in various ways, and with major ecosystem studies now completed but with minimal interaction between them, the foundation has been laid in the damage assessment and restoration programs for such a synthesis. And, with at least some GEM activities due to start in FY 2003 and to expand slowly over the first 5 years of the program, the time for a synthesis is in FY 2002-2003.

One of the primary needs for this synthesis includes an update of the current conceptual model of ecosystem forcing that is contained in the Gulf Ecosystem Monitoring Program Plan; GEM 2001 (www.oilspill.state.ak.us).

Since the occurrence of the spill much has been learned about long-term ecological change in the north Pacific, both due to human activities and due to climate variability. The efforts to ascribe ecological change to particular causes over the last 12 years have been focused on various aspects of the ecosystem and have produced over 300 publications by Trustee Council scientists and an almost equal number from Exxon-sponsored studies. Recent analyses of multiple biological and physical data sets indicate that large-scale climate-induced shifts occurred in the North Pacific in 1977 and 1989 (Hare and Mantua, 2000). These changes, particularly the change in mid-1970s corresponded with profound changes in the production of some fish stocks (Francis et al., 1998). Both of these shifts likely had consequences that interacted in unique ways with the massive damage from the *Exxon Valdez* oil spill and the subsequent recovery of the ecosystem.

B. Rationale/link to Restoration--

Beginning in 2003 a new phase of the restoration process will start, long-term monitoring supported by the Restoration Reserve. This monitoring program, the Gulf Ecosystem Monitoring Program (GEM) will have as one of its main goals detection of natural and anthropogenic change in the ecosystem. The program will be based on a conceptual model that describes how the ecosystem works and how it varies with external forcing factors, both natural and human. The program is being designed so that this model will change as our knowledge of the Gulf of Alaska matures and deepens. Ecological insight that can inform this conceptual model will be especially useful in the next several years. The National Research Council (NRC) is conducting a review of the proposed program and plan. One of their main recommendations is to build GEM on a good understanding of what has been learned from the last 12 years. In order to do this the NRC and many scientists familiar with the Restoration Program have suggested that a comprehensive scientific synthesis be performed.

C. Location

There is no field work being proposed for this project. The outcome of this study should contribute substantially to GEM and eventually to a better understanding of the ecosystem on which the coastal communities of the northern Gulf of Alaska depend.

COMMUNITY INVOLVEMENT AND TRADITIONAL KNOWLEDGE

We will interact with regional communities and subsistence users principally in two ways. First, In the first year of the project all of the community facilitators, and the Chugach Regional Resource Commission will be contacted during the information gathering phase of the project. They will be invited to contribute to the synthesis. Secondly, during the completion of the work a multimedia display will be developed to explain the findings of the study in understandable terms and presentations made at those communities that wish to participate.

PROJECT DESIGN

A. Objectives

The project has the following objectives for FY 2002:

1. Gather, read and evaluate the relevant reports, publications and other modes of information about the changes in the affected ecosystem between 1989 and 2002.
2. Gather any relevant publications and historical data sets and evaluate them in order to understand ecosystem changes that occurred before the spill.

3. Produce an outline of the integrated synthesis.
4. Find a journal willing to publish a dedicated volume, or obtain a publisher for the work as a book and negotiate the terms of a contract.
4. Begin writing the various chapters of the synthesis.

The objectives for FY 2003 include:

1. Complete rough drafts of the component chapters of the integrated synthesis.
2. Exchange drafts among authors for internal review and to revise chapters.
3. Make a multimedia presentation for the public.
4. Obtain outside peer review.
5. Submit synthesis to the publisher.

B. Methods

The methods for conducting this synthesis are those employed in a large scholarly undertaking. They can conveniently be broken down into the following steps:

1. *Gathering the relevant information.* All of the EVOS final reports are in the office of the Chief Scientist, who will serve as Principal Investigator and editor. These reports are also available as PDF reports online at www.dtlcrepository.downlegal.com/ARLIS-/PDF. Many of the publications from the scientific literature are also available in the office of the Chief Scientist or the EVOS Restoration Office in Anchorage. A bibliographies of Trustee- and Exxon-sponsored studies is kept by the EVOS Restoration Office. Publications will be gathered and distributed by administrative staff at Applied Marine Sciences (AMS). ARLIS, the natural resources library in Anchorage, is available to support this phase of the project. AMS also subscribes to Cambridge Scientific Abstracts, an online service that provides literature searches returning full references for publications and their abstracts. Each of the contributing authors will be asked to keep a reference list using Endnote software. These lists will be exchanged between authors and the editor to identify additional literature.
2. *Evaluation.* Each of the contributing authors will read the appropriate reports and examine the appropriate data sets and then evaluate them with regard to

anthropogenic and natural forces in ecosystem change. Contributing authors will be asked to take notes on phenomena reported by the authors of the primary literature that may qualify as the results of system forcing.

3. *Initial synthesis meeting*: Early in the project and after the initial evaluation of the literature all of the chapter authors will meet and discuss potential common emerging themes from their review of the reports and literature. From this effort an outline for the final synthesis chapter will be assembled.

4. *Chapter outlines*. Following the meeting each of the authors will produce a preliminary outline and reference list for circulation among the other authors and the editor. These will be reviewed and revised in light of the comments. The outline for the integrated synthesis will then be finalized.

5. *Obtaining a publisher*. The leading potential book publishers will be contacted to determine their interest in the synthesis based on the outline. A publisher will be chosen and negotiations for publications will be undertaken.

6. *Manuscript preparation*. The individual authors will write their chapters based on the outline. The editor will hold periodic conference calls and at least one face-to-face meeting per year will be held.

7. *Initial review*. Draft manuscripts will be exchanged among authors and with the editor during the first part of FY2003 for review.

8. *First revisions*. Review comments from authors and the editor will provide a basis for the first revision. The editor will monitor progress and encourage completion as the deadline for revisions of the drafts approaches. At this stage we will contract with an independent science writer to suggest changes to make the book more accessible and engaging for the non-scientist.

9. *Independent review*. Outside reviewers will be enrolled to review the revised manuscripts and provide written comments.

10. *Final revision*. The final revisions will be incorporated and the manuscripts submitted for publication.

C. Organization

The following is a tentative organizational scheme for the effort, which is subject to revision as the authors begin to formulate an outline of subjects:

1. Introduction

2. physical oceanography and climate
3. nutrients and biological oceanography
4. fishes
5. nearshore processes (limited)
6. birds and mammals
7. ecotoxicology
8. synthesis, including a revised conceptual model for GEM

A recent major review of shoreline and nearshore impacts of the spill has been completed (Peterson, 2001). So, although we are allocating some additional effort in this area, it will be more limited than other aspects of the synthesis.

D. Cooperating agencies, contracts, and other agency assistance.

The Principal Investigator is an employee of AMS, which is proposed as the prime contractor for production of this synthesis. All of the chapters will be written on fixed price contracts with the authors contracted as consultants to AMS.

SCHEDULE

A. Measurable project tasks for FY2002 and FY2003

December 2001	Preliminary chapter outlines and list of references due
March 2002	Outline finalized
June 2002	Negotiations with a publisher completed
October 2002	Rough drafts of chapters due from authors
December 2002	Completion of internal reviews
January 2003	Outside reviews initiated
March 2003	Outside reviews completed
May 2003	Multimedia presentation completed
July 2003	Revised chapters due to editor
September 2003	Final submission of all chapters to publisher

B. Project milestones (see schedule above)

C. Completion date

The project will be completed in September 2003.

Publication and Reports

A single book-length publication will be produced at the end of the two-year period. The title will be decided at a later date.

Professional conferences

The P.I. requests travel to one professional conference in 2003 to present the results of the synthesis effort and travel expenses to one annual EVOS meeting for each of the authors.

Normal agency management

Not applicable, as none of the authors is from an agency.

Coordination and integration

Coordination will be through the Office of the Chief Scientist working with the staff of the Restoration Office and ARLIS to obtain the materials necessary to complete the proposed work.

Proposed Principal Investigator

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Principal Investigator

Dr. Robert B. Spies has a Ph.D. from the University of Southern California (1971). He has over 30 years of experience in marine science. He has been Chief Scientist to the EVOS Trustee Council since 1990. In that role he has reviewed all of the

reports for the many scientific projects conducted following EVOS, conducted numerous workshops to identify gaps in studies of natural resources impacted by the spill, and has reported to the Executive Director and the Trustee Council on the status of the impacted ecosystem on a regular basis. Dr. Spies is also past editor of *Marine Environmental Research* and serves on its Editorial Board. He also serves on the Editorial Board of *Aquatic Toxicology*. He has over 40 publications on marine ecology and ecotoxicology.

Other key personnel

Dr. Thomas Weingartner. Dr. Thomas Weingartner is an observational physical oceanographer on the faculty of the University of Alaska's Institute of Marine Science. For the past twelve years he has conducted research in the seas and oceans surrounding Alaska, including the Gulf of Alaska, Prince William Sound, and the Bering, Chukchi, and Beaufort seas. He is currently a Principal Investigator in the Gulf of Alaska GLOBEC program. His research interests include the effects of physical environmental variability on marine ecosystems.

Robert T. Cooney received his doctoral degree in Biological Oceanography from the University of Washington, Seattle (1971). He joined the faculty of the University Alaska Fairbanks and studied the plankton communities of Alaska waters for 30 years. His specialties include zooplankton assemblages found in coastal, shelf and oceanic waters of the northern Gulf of Alaska and Bering Sea. Dr. Cooney has had extensive experience with food-webs supporting juvenile pink salmon in Prince William Sound dating back to 1976. Collaborative investigations with the Prince William Sound Aquaculture Corporation and Alaska Department of Fish and Game were responsible for acquiring and using a real-time oceanographic buoy system in the Sound to log seasonal and annual changes in surface ocean climate and plankton. Most recently Dr. Cooney was the Lead Scientist for the EVOS-sponsored Sound Ecosystem Assessment (SEA) study of the post-spill recovery of pink salmon and herring. He is presently helping to revise the Gulf Ecosystem Monitoring program and implementation studies.

Dr. Stan Rice-Stanley D. Rice has a Ph. D. in comparative physiology from Kent State University (1971). He has 30 years of experience in oil pollution work in Alaska; 15 years of program manager experience at the Auke Bay Lab; 12 years of experience on the *Exxon Valdez* spill. Short and long-term damages, and oil persistence are his primary research areas. Dr. Rice has over 100 peer-reviewed publications on oil effects. These publications include reviews and synthesis articles, covering effects of oil on fish, and specifically effects of oil on pink salmon. He has also contributed to the National Academy of Science reviews of

oil inputs and effects. Dr. Rice has 25 papers on other contaminant issues as well.

Dr. Alan Springer has been involved in marine bird and mammal research in the N. Pacific for 25 years. In that time He has conducted studies at numerous breeding sites and at sea from southeastern Alaska to the Arctic Ocean, thereby gaining first hand knowledge of the haunts and habits of seabirds and marine mammals and an appreciation of the needs for and limitations of information on them. He also has broad experience in oceanographic studies and in research with lower trophic levels. As a peer reviewer during development of the APEX study, and as a core reviewer now, he is familiar with studies that have been supported by EVOSTC, as well as by others that are relevant to the goals of this synthesis. Throughout his career, he has attempted to understand birds, mammals, fish, and plankton in the context of marine food webs and the physical environment. Dr. Springer has published several papers that synthesize large amounts of information on various aspects of the marine ecology of the N. Pacific

Dr. Philip Mundy-- Dr. Mundy has a Ph.D. from the University of Washington (1979). Dr. Mundy has 27 years of experience as a fisheries scientist, including 24 years in Alaskan fisheries research and management. His work included being a reviewer of fisheries research on the oil spill from 1989 until he joined the Trustee Council staff in 1999. Dr. Mundy currently is the Chief Scientist for the Gulf Ecosystem Monitoring and Science Coordinator, Exxon Valdez Oil Spill Trustee Council, Anchorage, AK.

Nearshore biologist--We will designate an experienced nearshore biologist for a more limited synthesis effort. This invitation will be based on needs identified by the contributing authors once existing work has been reviewed and as the subject matter is developed for the synthesis.

Personnel time allocation

The involvement of the Chief Scientist, Dr. Spies, in the Restoration Program, is declining, particularly with regard to holding reviews and workshops. It is also anticipated that more of the administrative functions for the science program will reside in the EVOS office in FY2002-FY2003 than had previously been the case. Consequently, Dr. Spies will have the time to act as the Principal Investigator for this effort. Dr. Spies will be a very active editor and bring his extensive knowledge of the program to bear. He will be engaging the authors on a variety of issues and suggesting cross-cutting themes in the synthesis.

With regard to the time needed for Dr. Mundy, who is Chief Scientist for the GEM Program, to participate, there are several factors to consider. Dr. Mundy has already started a major effort to summarize the findings from studies of fish following the spill and has much to contribute in this regard. In October of 2001, we will make an assessment as to whether Dr. Mundy has the time to participate, or whether he should drop to the status of a co-author and find another lead for the chapter on fish.

Literature Cited

Francis, R.C., S.R. Hare, A.B. Hallowed and W.S. Wooster. 1998. Effects of interdecadal climate variability on the oceanic ecosystems of the NE Pacific. *Fisheries and Oceanography* 7, 1-21.

Hare, S.R. and N.J. Mantua. 2000. Empirical evidence for North Pacific regime shifts in 1997 and 1989. *Prog. Oceanogr.* 47, 103-145.

Peterson, C. 2001. The *Exxon Valdez* oil spill in Alaska: Acute, indirect and chronic effects on the ecosystem. *Advances in Mar. Biol.* 39, 1-103.

Scientific Support Services-Planning for EVOS Synthesis
Year 2, Cost Summary
Prepared by
Applied Marine Sciences, Inc.

<i>Task & Personnel</i>	<i>Total Hours</i>	<i>Rate</i>	<i>Cost</i>	<i>Total</i>
<i>SYNTHESIS</i>				
Robert Spies	730	\$119.31	\$87,096.30	
Diane Stafford	51	\$29.78	\$1,518.78	
Sue Chase	88	\$55.73	\$4,904.24	
Deborah Florer	76	\$42.41	\$3,223.16	
Nearshore Biologist	50	\$100.00	\$5,000.00	
Contract Writers	640	\$100.00	\$64,000.00	
Reviewers	25	\$100.00	\$2,500.00	
Scientific Editor	100	\$100.00	\$10,000.00	
<i>Subtotal</i>			#####	\$178,242
<i>Other Direct Costs</i>				
Travel			15,852.00	
Printing/Communications			1,500.00	
Graphic Presentations			12,000.00	
Publication Costs			50,000.00	
Miscellaneous			1,200.00	
<i>Total Direct Costs</i>				\$80,552
<i>Total Labor and Direct</i>				\$258,794
Gen. and Admin. Overhead	6.40%		\$16,562.85	
Fee (5%)			\$13,767.87	
<i>TOTAL COST</i>				\$289,126