

EVOS Trustee Council Final Report

Project Number:	01535	
Restoration Category:	Public Information	
Proposer:	Restoration Office, Exxon Valdez	Dil Spill Trustee Council
Lead Trustee Agency:	Restoration Office (ADFG)	
Cooperating Agencies:	None	
Alaska SeaLife Center:	No	
Duration:	1st year of a 2-year project	
Cost FY 01:	\$91,200	APR 1 1 2000
Cost FY 02:	\$46,750	ing the transformer La Viene and the La La Viene and the La La Viene and the second
Cost FY 03:	\$0	
Geographic Area:		
Injured Resource/Service:	All injured resources and services	

ABSTRACT

This project will provide a final report for the activities of the Trustee Council, starting with the earliest damage assessment efforts and ending with the FY 02 Work Plan and disbursements of the final payment from Exxon. It will also include a complete history of the litigation leading to the civil settlement, which funds the Trustee Council. This project will increase public awareness and understanding of EVOS restoration activities, policies, and procedures. It will provide agencies and groups (facing a similar trustee situation) with a detailed history of the *Exxon Valdez* Oil Spill Restoration process, including highlights and pitfalls, so that others can benefit from lessons learned in the EVOS groundbreaking effort. This published history will include references and an index.

INTRODUCTION

This project arises from the need to provide a single source documenting 12 years of litigation, damage assessment, and EVOS restoration activities, policies, and procedures. It is appropriate to issue such a final report after the Trustee Council decides on its final work plan (FY 02), all the payments from Exxon are received and disbursed, and long-term programs for monitoring/research and habitat protection are in place.

The final report would cover:

Introduction

Chapter One: Litigation and the Settlements

Chapter Two: Damage Assessment

Chapter Three: Early Trustee Council

Chapter Four: Re-organization of Restoration Office and the Restoration Plan

Chapter Five: Research, Monitoring, and Restoration

- including the Work Plan process

Chapter Six: Habitat Protection

- including the nomination, evaluation, appraisal, and negotiation processes Chapter Seven: Restoration Reserve, Investments, GEM, Long-term Habitat Protection Chapter Eight: Public Advice and Public Information

Chapter Nine: Recovery Status

References

Index

Appendices

- Final and Annual Reports
- Bibliography
- Settlement

NEED FOR THE PROJECT

A. Statement of the Problem

The scope of EVOS litigation and restoration is unprecedented in U.S. environmental history. Although there were laws and regulations in place to guide the process, there was no manual available for a combined federal-state trustee council with such an enormous task ahead of it, guaranteed financial resources available to it, and a varied constituency taking part every step of the way. Much of what the Trustee Council did broke new ground and the entire process needs to be synthesized into a documented, readable history available to the public, government agencies, and any group that might face similar circumstances.

Over the years, the Trustee Council has received dozens of inquiries from other trustee groups and hundreds of inquiries from college students wanting to report on different aspects of the EVOS process. This final report would provide a single referenced source for these needs and others that might arise in the future.

B. Rationale/Link to Restoration

This effort provides vital information to the public, government agencies, and private groups concerning processes of litigation, damage assessment, and restoration efforts.

C. Location

No field work is planned for this project.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

This project will help document community involvement and TEK efforts, providing an argument for such efforts in future trustee situations.

PROJECT DESIGN

A. Objectives

Research, write, and publish a readable, documented history of EVOS litigation and Trustee Council activities from March 1989 to October 2001.

B. Methods

Research for the book will rely mostly on the public record. A thorough review will be conducted of EVOS documents, including Trustee Council minutes and transcripts, agenda packets, policies and procedures, restoration frameworks, planning documents, work plans, scientific reports, habitat protection packages, and more. In addition, court records, litigation-based scientific studies, settlement language, and any publicly available Alaska Department of Law and U.S. Department of Justice documents relating to the case will be scrutinized, along with legislative and Congressional records related to the settlement. A review of media articles from 1989-present will also help focus on public concerns and attitudes about the settlement, damage assessment, and Trustee Council activities.

Interviews of major players will be conducted to fill in gaps in the documentation, particularly as part of the litigation and damage assessment processes. Other interviews will provide personal - assessments of the Trustee Council process.

The final report will be researched, written, and designed by the communications coordinator for the Trustee Council. To help ensure objectivity and make sure all essential topics are covered and documented thoroughly, an editor specializing in non-fiction historical writing will be identified and contracted as a consultant/editor. An effort will be made to find an outside publisher to provide peer-review, editing and design for the finished product (with financial assistance from the Trustee Council). If no publisher is willing to take on the project, then the final report will be published by the Trustee Council.

C. Cooperating Agencies, Contracts, and Other Agency Assistance None

SCHEDULE

A. Measurable Project Tasks for FY 01

October - December, 2000

a. Research EVOS administration files

b. Research litigation records

c. Research legislative and Congressional records and Office of the Secretary records for

Department of Transportation and Department of the Interior

d. Interview key parties

e. Organize documents

March 1, 2001 First Drafts of Chapters 1, 2 & 3 completed

June 1, 2001 First Drafts of Chapters 4, 5, & 6 completed

September 1, 2001 First Drafts of Chapters 7, 8, & 9 completed

September 30, 2001 Complete references, appendices

B. Project Milestones and Endpoints

The final report should be printed during the winter of 2001-2002. Publication date will depend on the schedule of a publisher. The Restoration Office will seek to have the publication available around March, 2002.

C. Completion Date March 2002

PUBLICATIONS AND REPORTS

The final report will be published and an as-yet-undetermined number of copies will be made available to the public, stakeholders, PIs and agencies.

PROFESSIONAL CONFERENCES

Participation in professional conferences is not anticipated.

NORMAL AGENCY MANAGEMENT

This project would not fall under normal agency management.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

Research for this project is underway in FY 00 with funds from the 00100 budget.

PROPOSED PRINCIPAL INVESTIGATOR

Joe Hunt, Communications Coordinator *Exxon Valdez* Oil Spill Trustee Council 645 G Street, Suite 401 Anchorage, Alaska 99501 907-278-8012 907-276-7178 (fax) <joe_hunt@oilspill.state.ak.us>

PRINCIPAL INVESTIGATOR

Joe Hunt has 17 years of experience in Alaska in communications, journalism, public relations, publications, and advertising. He has been communications coordinator of the Trustee Council since 1996. Joe's role will be to conduct all research and interviews, write the final report, work with an outside consultant/editor, rewrite the report (as needed), coordinate activities with the Restoration Office and Trustee Council for review and final approval of the text, arrange for photographs and artwork (as needed), and design and publish the final report (or work with a publisher to design and publish the report).

OTHER KEY PERSONNEL

Outside consultant/editor - to be determined_ 2000 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET October 1, 1999 - September 30, 2000

	Authorized	Proposed						
Budget Category:	FY 2000	FY 2001						
Personnel		\$62.0						
Travel		<u>φ02.0</u> \$7.1						
Contractual		\$12.0						
Commodities		\$0.0						
Equipment		\$0.0		LONG R	ANGE FUNDIN	IG REQUIREM	IENTS	
Subtotal	\$0.0	\$81.1	·····		Estimated			
General Administration		\$10.1			FY 2002			
Project Total	\$0.0	\$91.2			\$46.8			
Full-time Equivalents (FTE)		0.8						
			Dollar amour	nts are shown ir	n thousands of	dollars.		
Other Resources						•		
Comments:								
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EV01	Project Num							TRUSTEE
FTUI	Project Little:	EVOS Trust		inal Report	0.0			AGENCY
	Agency: Dep	ot. of Fish &	Game, EVO	S Restoration	n Office			SUMMARY
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		Agency: Dept. of Fish & Game, E	VOS Restoration	Office			

Prepared:

2000 EXXON VALDEZ TRUE E COUNCIL PROJECT BUDGET October 1, 1999 - September 30, 2000

Contractual Costs:			•	<u> </u>	Proposed
Description	······································				FY 2000
to be determined	Consultant/Editor		1	12	12.0
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When a non-trustee organization	is used, the form 4A is required.			Contractual Total	\$12.0
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Description	······································	:		· · · · · · · · · · · · · · · · · · ·	FY 2000
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Prepared:		-			<u></u>
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2000 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET October 1, 1999 - September 30, 2000

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FY 2000
			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 B	New Eq	uipment Total	\$0.0
Existing Equipment Usage:		Number	Inventorv
Description		of Units	Agency
		<u>':</u>	
		F	
Project Number: 6/5 33			quinment
FTUI Project Litle: EVOS Trustee Council Final Report			
Agency: Dept. of Fish & Game, EVOS Restoration Office			
Proporod:			

Synthesis of Spill Damaged Resource Information into the Biological Conservation Database

Project Number:	01534	
Restoration Category:	Habitat Improvement; Ecosystem Synthesis/ Transition to long-term monitoring and rese	GEM Transition arch program
Proposer:	Keith Boggs	
	Tracey Gotthardt Alaska Natural Heritage Program Environment and Natural Resources Institut University of Alaska Anchorage	e
Lead Trustee Agency: Cooperating Agencies: Alaska SeaLife Center:	No	RECEIVED
Duration:	1st year, 1-year project	APR 1 3 2000
Cost FY 01:	\$97,000	
Cost FY 02:	\$0	EXXON VALDEZ OIL SPILL
Geographic Area:	No field work	TRUSTEE COUNCIL
Injured Resource/Service:	All species and ecosystem resources	

ABSTRACT

The project will synthesize all information pertaining to conservation biology on resources damaged by the *Exxon Valdez* oil spill into the Biological Conservation Database (BCD). The BCD is part of an effort by The Nature Conservancy, Association of Biodiversity Information and the network of 86 Natural Heritage Programs throughout the Western Hemisphere to document information on terrestrial and near-shore endangered animals, plants and ecosystems. It is the largest effort of its kind and contains a catalogue of all the vertebrate animals and vascular plants known from North America, plus many species on invertebrate animals and nonvascular plants. The incorporation of spill effected resource information into the BCD will ensure linkage of EVOS funded information to broader based conservation efforts. It will also provide a permanent method to store the information for tracking the status of the damaged resources over time. The information will be transferred to resource managers, conservation groups and other users through existing methods including web pages, presentations and data requests.

INTRODUCTION

The Alaska Natural Heritage Program (AKNHP) is proposing to synthesize all conservation biology information related to *Exxon Valdez* oil spill damaged resources into the Biological Conservation Database (BCD). This database represents the largest ongoing effort in the Western Hemisphere to gather standardized data on terrestrial and near-shore endangered animals, plants and ecosystems. Natural Heritage Programs, The Nature Conservancy and the Association of Biodiversity Information maintain the BCD. It contains a catalogue of all the vertebrate animals and vascular plants known from North America, plus many invertebrate and nonvascular plant species. The results will ensure that the huge volume of *Exxon Valdez* Oil Spill Trustee Council (EVOS) funded conservation information is incorporated into broader based conservation efforts. The BCD will also provide a permanent method for tracking the status of the damaged species over time.

The proposed project is not meant to supplant the EVOS Gulf Ecosystem Monitoring synthesis projects. But rather, is simply a method of focusing EVOS funded information into a conservation biology effort that has proven highly effective in protecting and identifying endangered species and ecosystems, and for transferring the information to users. The proposed project will help EVOS to apply their information at both the regional (such as Prince William Sound) and global scales.

The damaged resources to be incorporated into the BCD are given in Table 1. Additional species that are of interest to EVOS will also be incorporated such as the black-legged kittiwake (*Rissa tridactyla*). Injured resources not included are lost or reduced human services, and archaeological resources.

Recovered	Not Recovering	
Bald Eagle	Common loon	
River Otter	Cormorants (3 species)	
	Harbor seal	
Recovering	Harlequin duck	
Black oystercatcher	Killer whale (AB pod)	
Clams	Pigeon guillemot	
Common murre		
Intertidal communities	Recovery Unknown	
Marbled murrelet	Cutthroat trout	
Mussels	Designated wilderness areas	
Pacific herring	Dolly Varden	
Pink salmon	Kittlitz's murrelet	
Sea otter	Rockfish	
Sockeye salmon		
Subtidal communities		

Table 1. The project will address the following list of injured species and ecosystems listed by recovery status.

The best way to describe the proposed project is to first give a brief history of the BCD, and then describe how information is incorporated and used to address biodiversity issues. In the early 1970's, The Nature Conservancy conceived the idea of a national network of Natural Heritage Programs. Each would gather and provide information on rare and endangered animals, plants

and ecosystems in a standardized and scientifically rigorous manner. The Nature Conservancy, industry and government agencies would then use this information to ensure the conservation of rare species and biological diversity over time. There are now 86 Natural Heritage Programs operating in the Western Hemisphere, covering all 50 US states, several US Bioreserves and National Parks, Puerto Rico, nine Canadian provinces, and 13 countries in Latin America. They are based within State agencies, Universities and The Nature Conservancy. Alaska's Heritage Program was established in 1989 within The Nature Conservancy, and in 1993 became part of the University of Alaska Anchorage, residing in the Environment and Natural Resources Institute. The core of the Natural Heritage effort is the Biological Conservation Database, which links together diverse sets of data on species, ecosystems, and land throughout the world. In recognition of the BCD's depth and attention to objective data, The Nature Conservancy and Heritage network received the prestigious Computerworld/ Smithsonian Award.

To build the BCD, Heritage Programs assign a rank to each species or ecosystems in its state, indicating its occurrence (i.e. common, uncommon, rare) within the state. Ecosystems are approached at multiple scales and include units such as tidal marshes or old growth Sitka spruce (*Picea sitchensis*). Information from a wide variety of sources supply the data for this effort, such as State departments of Fish and Game, various Federal agencies such as US Fish and Wildlife Service and the USDA Forest Service, and from Universities, environmental groups and museums. The Nature Conservancy uses the combined data from Heritage operations to generate a global or G rank. Heritage Programs then develop profiles of each species, concentrating on their distributions and habitat needs. Distributions are mapped using Geographic Information Systems (GIS) and then each site is assigned a rank, indicating its suitability as a place to sustain the species. A more detailed description of the BCD is given in the methods section.

For fully documented species, Heritage researchers can ask if most of the suitable regions for a species are in protected areas, suggesting a stable future for that species, or whether sites are exposed to threats that may lead to a future decline of the species. For resource use purposes (i.e. fishing or timber harvesting), the BCD can distinguish between a marginal region where a species is only hanging on and a highly suitable region that may be much more important to the species' future. When used in planning, Heritage data can reduce or avoid resource use conflicts and surprises. For example, cataloging the location of marbled murrelet nests in old growth forests can help guide timber harvest practices to avoid future resource conflicts. For more information on the BCD at the National level please see the web page cf-proto.abi.org, and for Alaska see uaa.alaska.edu/enri/aknhp web/index.html

NEED FOR THE PROJECT

A. Statement of Problem

There is a need to integrate all rare species and ecosystem information at both the local scale (such as Prince William Sound) and global scale. The primary effort to accomplish this goal is the network of Natural Heritage Programs. Because of this multi-scale approach, Heritage information forms core elements of the US Fish and Wildlife Service's endangered species program and Gap programs. It is also used as the primary information source for the USDA Forest Service-Alaska Region's sensitive species list, the Environmental Protection Agency's endangered species list, the Federal–State of Alaska sensitive areas working group for hazardous spills, and for environmental assessments on federal and state lands.

The multiple research projects on EVOS damaged resources have employed various sampling methodologies that have produced scattered and inconsistent population data, often with conflicting results. Spatial and temporal gaps in most data sets are the norm rather than the exception. In fact, many of the EVOS studies— Sea Ecosystem Assessment (SEA) and Alaska Predator Ecosystem Experiment (APEX)—will end leaving temporal gaps in field data useful for monitoring efforts. Incorporation of such pertinent information into the BCD will insure that it is used for biodiversity purposes and provide a permanent method to store the data.

A problem that the EVOS Trustee Council has identified is the ongoing need to transfer study results to resource managers and stakeholders so that they may take full advantage of what has been learned through the EVOS program. At present, information transfer tends to be between researchers and not to resource managers. The BCD provides a proven method to transfer EVOS derived conservation biology information to resource managers and other data users.

B. Rationale/Link to Restoration

The project will help the recovery of damaged resources by providing an accurate and costeffective means to monitor the recovery of species and ecosystems in the spill-affected region. The BCD allows the public and resource managers the ability to view the recovery of the oil effected area from both a coarse (ecosystem) and fine (species) ecological framework. The data will also help determine what marine and terrestrial areas are most important to protect in view of their biological significance.

The project should also be done because monitoring the health of species and systems is important for both economic and biodiversity issues, as is the case in the oil spill affected area in which the two are closely linked. Most of the coastal villages are heavily dependent on the fishing industry; especially Native American subsistence harvests (e.g. herring, salmon).

C. Location

This project will be conducted at the Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage. AKNHP's office is located off-campus at 707 A Street, Anchorage, Alaska.

All communities in the oil-affected area will realize benefits by having access to the data-system through data requests, a Web page and BCD presentations.

COMMUNITY INVOLVEMENT AND TRADITIONAL KNOWLEDGE

Communities will be informed about the project through existing information transfer efforts. This includes presentations of EVOS conservation biology results to community groups and resource managers on request. This community information outreach includes communication of results in non-technical terms.

All relevant information—including traditional knowledge—will be incorporated into the datasystem. Dr. Henry P. Huntington and the WHISKERS database will be contacted to understand the status of traditional knowledge and how to access it. AKNHP has a strong history of

working with Native American groups and villages and will continue this tradition during the proposed project. Examples of this work include a current project with the Bristol Bay Native Association to develop environmental indicators for the Nushagak-Mulchatna watershed, and a project on medicinal flora of the Alaska Natives (Garibaldi 1999).

PROJECT DESIGN

A. Objectives

- 1. Synthesize conservation biology information that relates to spill damaged resources in the North Gulf of Alaska into the Biological Conservation Database. This will ensure EVOS linkage to broader based conservation efforts.
- 2. Provide a permanent method to store EVOS conservation biology information for tracking the status of the damaged resources over time in the oil spill effected region.
- 3. Transfer the EVOS funded conservation biology information to people in need of it such as resource managers, conservation groups, and other users.

B. Methods

The overall methodological steps are to: gather information on oil spill damaged species and ecosystems regardless of source or age of the data, synthesize the information into the BCD, and transfer it to resource managers and other users.

Gather Information

The geographic range of the project will be the Northern Gulf of Alaska. All conservation biology information (Table 2) related to the spill damaged resources and other species of interest will be gathered from a variety of federal, state and private sources. This includes data from other databases such as the EVOS Research and Restoration Project Database, AKNHP, and the National Marine Fisheries Service. Maps and data will be reviewed and digitized using ArcInfo GIS software for spatial data not already in GIS coverages. To provide consistency and the ability to process between maps AKNHP will integrate pertinent GIS maps into a common format and projection. For those data that are automated but do not reside as a GIS layer, formatting will be performed to import the data with associated coordinate and attribute information.

Tuble 2. Examples of types of monitation me	Tuble 2. Examples of types of mormation meetporated into the Bob.						
Species Information	Ecosystem Information						
Population size by area, year and season	Ecosystem description						
Population range by year and season	Ecosystem distribution						
Species health and trend	Ecosystem health and trend						
Suggested protection needs	Suggested protection needs						
Species rarity ranking							
Species-important life history components	Bibliographic Information						
Food source range by year and season	Abstract						
Food source status	Citation						
Food source size	Results or conclusions						

Table 2. Examples of types of information incorporated into the BCD.

BCD Description

The Biological and Conservation Database is a powerful state-of-the-art information management tool designed to address conservation biology issues. The system is maintained at the local level (State or Province) by Heritage Programs and at the National and Global level by both The Nature Conservancy and the Association of Biodiversity Information.

The BCD is built upon a set of standard fields and files. These are the basic structures that make it possible for different Heritage Programs in different parts of the world to collect, exchange, and disseminate information. By establishing this set of standard data fields and files, the BCD System helps to promote a common vocabulary that unites people and purposes. These types of information, alternatively called the "major logical entities", include such types as:

- Source: A unit of information about an element, element occurrence, site, managed area, etc., (e.g., a book, article, thesis, field notes, etc.).
- Element: A unit of natural biological diversity. Fine "filters" of diversity include plants and animals; coarse filters include communities (repeatable assemblages of species that share a common environment) and "other" types (e.g., marine mammal haulouts, migratory bird concentrations, breeding bird concentrations, etc.). Some Heritage Programs also define geologic and aesthetic Element types.
- Element Occurrence: A specific example of an Element at a specific geographic location that represents a habitat capable of sustaining or contributing to the survival of that Element. This is the fundamental unit which drives all further protection and land management activities.
- Site: A land unit of ecological or other scientific interest, usually defined for purposes of conservation planning (but may be defined for any area for which ecological or other scientific information is needed).
- Managed Area: A land unit, generally a natural area, that is under distinct protective or potentially protective natural resource management.

Four entities are unique in that they have geographic characteristics and may be mapped. These include element occurrences, sites, managed areas, and tracts (not defined). For any element occurrence (species or ecosystem location) the user will be able to access coarse scale maps of the Northern Gulf of Alaska for orientation purposes including bathymetry, and USGS 1:63360 quads, and zoom in on any region of interest. Finer scale layers such as species range, haulouts, bird colonies, seasonal locations, and habitat will be included. Ancillary data per location will include such variables as population size, dates of occurrence, causes of population change, photographic records, etc. (Table 2).

Whereas the GIS used in conjunction with the BCD can separate different entities (element occurrence, site, etc.) onto different overlays, a database system, such as the BCD System, relies on conceptual distinctions to segregate data: scientific and ecological data goes in the Site files, management data in the Managed Area files, and legal ownership data in the Tract files. The BCD provides a tool for sorting out data for a complex conservation geography of rare Element Occurrences, conservation Sites, protected Managed Areas, and legal ownership patterns.

These geographic entities, together with the Elements, form the backbone of the BCD System. All other entities that characterize the biological diversity inventory, protection, and land management endeavor revolve around these fundamental entities representing biodiversity itself, and the land or marine unit that supports it. Information, however, is dynamic and in order to meet the diverse and growing needs of an extensive network of users, the BCD System must be flexible. Toward this end, the System has been equipped with a set of accessory files known as the Optional files. When standard fields cannot support specific local needs, these optional files will generally provide the flexibility needed.

A full bibliography will also be incorporated into the BCD. Fortunately, most citations have already been compiled through various sources (USGS-Biological Resources Division Prince William Sound Ecosystem Initiative, Cook Inlet Information Management System, Kachemak Bay Ecological Characterization, and AKNHP's Biological Conservation Database). AKNHP will work cooperatively with these groups to ensure a thorough integration of the bibliographies.

Transfer of information

Web pages and data request procedures already exist through AKNHP, The Nature Conservancy and the Association of Biodiversity Information to transfer the results of the proposed project to end users. Also, AKNHP staff typically give up to ten talks a year on available BCD information.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

No other Trustee agency is requesting funds for the project, and no components of the project will be contracted to the private sector or government agencies.

SCHEDULE

A. Measurable Project Tasks for FY 01 (October 1, 2000 – September 30, 2001)

February 30:	Finish gathering all conservation biology information related to spill
	damaged resources
June 30:	Enter information into the Biological Conservation Database
August 30:	Enter geographic information into ArcView or ArcInfo
September 30:	Place results on AKNHP WebPage and transfer information to the
-	Association of Biodiversity Information

B. Project Milestones and Endpoints

September 30, 2001: All objectives will be met

C. Completion Date

September 30 2001:All objectives completed.April 15, 2002:Final EVOS report due

PUBLICATIONS AND REPORTS

No peer-reviewed manuscripts will be produced. The final report will be completed April 15, 2002

PROFESSIONAL CONFERENCES

Trustee Council's Annual Restoration Workshop, January 2001, Anchorage, Alaska. One paper will be presented on the transfer of the EVOS conservation biology information to the BCD and how to access the results.

NORMAL AGENCY MANAGEMENT

Not applicable

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

The proposed project will be integrated with other restoration efforts by synthesizing their results into the data-system.

PROPOSED PRINCIPAL INVESTIGATOR

Keith Boggs Alaska Natural Heritage Program Environment and Natural Resources Institute University of Alaska Anchorage 707 A Street Anchorage, AK 99501 Work 907 257-2783 Fax 907 257-2789 ankwb@uaa.alaska.edu

Tracey Gotthardt Alaska Natural Heritage Program Environment and Natural Resources Institute University of Alaska Anchorage 707 A Street Anchorage, AK 99501 Work 907 257-2782 Fax 907 257-2789 antg@uaa.alaska.edu

PRINCIPAL INVESTIGATORS

Keith Boggs

Keith Boggs is the Interim Program Manager and vegetation ecologist for AKNHP. His qualifications in relation to this project are in project management and the coordination of databases. He has experience as principal investigator coordinating multiple projects at UAA, and is currently principal investigator on two projects both with the USDI National Park Service. Past projects ranged from describing tidal marshes, to conducting representativeness assessments using GIS (Boggs and Shephard 1999, Duffy et al. 1999). His experience in coordinating databases includes involvement with a current National Park Service project that integrates satellite image processing, GIS, Web Page and database programs to develop a Web based satellite map product. He is also knowledgeable of the various programs used to maintain and distribute AKNHP information (ArcInfo, ArcView, and Biological Conservation Database). He would also review the BCD synthesis of terrestrial and intertidal community information such as old growth habitat for marbled murrelets (*Brachyramphus marmoratum*) and tidal marsh

Tracey Gotthardt

Tracey Gotthardt would review the majority of the marine information for inclusion in the BCD. She is completing her Masters at the University of Alaska Anchorage on foraging ecology of harbor seals in southcentral Prince William Sound, 1994-1997. One aspect of this project involved synthesizing interagency (i.e. APEX, SEA, and ADF&G) datasets on forage fish abundance and distribution, which included collaborating with numerous EVOS funded PI's. Tracey has ten years experience working in marine environments in Alaska, and has performed research on several EVOS damaged species, including Pacific salmon, harbor seals, and marbled murrelets. She has five years experience working with the APEX project, and is familiar with much of the sampling and research that is being conducted on seabird and forage fish interactions in Prince William Sound. She also has extensive GIS experience, and has worked on projects ranging from sand lance habitat selection modeling in Prince William Sound, to a marbled murrelet habitat suitability model. Her BCD experience includes compiling all harbor seal literature and sightings throughout Alaska. She is currently working on a data inventory for all mammal and bird species in Alaska's National Parks.

OTHER KEY PERSONNEL

Julie Michaelson

Julie Michaelson would coordinate the data entry into the BCD. Her qualification in relation to this project is her expertise in summarizing Alaskan biological information into a GIS format that is useful for end users. Her current position is as data manager for AKNHP, and is currently working on the creation of the zoological database layers that reside in the ArcInfo GIS system running on the SUN UNIX work station. Another project is creating GIS data-layers for the EVOS funded APEX study. She has constructed all export files that have been used to create the Internet graphics and has had extensive experience in the transfer of data into a variety of textual and graphic formats across platforms.

Alaska Natural Heritage Program

AKNHP's overall mission and linkage to other conservation organizations also provides significant qualifications for completing the project at the highest level of quality possible.

AKNHP is a leader in the field of conservation biology in Alaska, maintaining the only statewide database—the BCD—on rare species and ecosystems. AKNHP's close ties to The Nature Conservancy and the Association of Biodiversity Information ensures that the latest conservation techniques are employed and that Alaska's conservation information is used at both regional and global scales. AKNHP also has extensive experience producing products in the field of conservation biology including managing the APEX project, and conducting seabird, marine fish, and marine mammal projects (Sherburne 1993, Wilbor 1999, Gotthardt 1999).

AKNHP is part of UAA, yet has a distinct mission—tracking Alaska's biodiversity—and is relatively independent of University demands such as teaching and committees. This allows AKNHP to be cost effective and highly efficient. AKNHP would also be cost-effective because some of the needed information for the project is already in-house. For example, AKNHP has information on 12 of the 24 species and ecosystems that are proposed for monitoring. AKNHP also has the computer resources to efficiently conduct the project including two Sun Unix Ultra with ArcInfo software, HP series E color plotter, HP color LaserJet 5M, ArcView/Spatial Analyst, Pentium PC's with Excel, Microsoft Word, Access databases (plus others), Macintosh Internet software and a scanner.

LITERATURE CITED

Boggs, K., and M. Shephard. 1999. Response of vegetation and landform on marine deltaic surfaces to geologic uplift. Journal of Wetland Scientists 19:13-27

Duffy, D.C., K. Boggs, R. Hagenstein, R. Lipkin and J.A. Michaelson. 1999. A landscape assessment of the degree of protection of Alaska's terrestrial biodiversity. Conservation Biology, 13: 1332-1343.

Garibaldi, A. 1999. Medicinal flora of the Alaska natives. Alaska Natural Heritage Program, University of Alaska Anchorage, Anchorage AK.

Gotthardt, T. 1999. The foraging ecology of harbor seals in southcentral Prince William Sound 1994-1997. Masters thesis. University of Alaska Anchorage, Anchorage, Alaska. Expected due date June 2000.

Sherburne, J. 1993. Status report on the short-tailed albatross *Diomedea albatrus*. Alaska Natural Heritage Program, University of Alaska Anchorage, Anchorage AK.

Wilbor, S.L. 1999. Status report on the bering/Pacific Oldsquaw (*Clangula hyemalis*) Population. Alaska Natural Heritage Program, University of Alaska Anchorage, Anchorage AK.

2001 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

	Authorized	Proposed	
Budget Category:	FY 2000	FY 2001	
Personnel		\$75.6	
Travel		\$0.0	
Contractual		\$0.0	
Commodities		\$0.0	
Equipment		\$2.0	LONG RANGE FUNDING REQUIREMENTS
Subtotal	\$0.0	\$77.6	Estimated
Indirect		\$19.4	FY 2002
Project Total	\$0.0	\$97.0	\$0.0
-			
Full-time Equivalents (FTE)		1.3	
			Dollar amounts are shown in thousands of dollars.
Other Resources			
Comments:			
The UAA indirect cost rate is 25	% for all Exxor	n Valdez oil sr	pill restoration projects.
The proportion of project costs f	for NEPA com	bliance is 0%.	annual restoration workshop attendence 1%, report writing 5%, publications and
professional conferences 0%, a	nd community	involvement 5	5%.
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			· ·
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· · · · ·	Project Nu	mbor 015	3(
			FORM 4A
FY01	Project Little	e: Synthesis	s of spill damaged resource information into Non-Trustee
• • • •	the Biologic	cal Conserv	vation Database SUMMARY
	Name: Ala	ska Natura	I Heritage Program
Prepared: April 10 2000			1 of

2001 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Personnel Costs:				Months	Monthly		Proposed
Name	Position Description			Budgeted	Costs	Overtime	FY 2001
K. Boggs	Ecologist			1.0	7.0		7.0
T. Gotthardt	Zoologist			10.0	4.3		43.0
J. Michaelson	Database manager			4.0	6.4		25.6
							0.0
							0.0
		-					0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		15.0	17.7	0.0	
					Per	sonnel l'otal	\$75.6
Travel Costs:	• ····· ·	:	licket	Round	Total	Daily	Proposed
			Price	l rips	Days	Per Diem	FY 2001
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
	· · · · · · · · · · · · · · · · · · ·			•		Travel Total	\$0.0
	Project Number:					F	ORM 4B
	Project Title: Synthe	esis of spill dan	naged resou	rce informat	ion into	F	Personnel
	the Biological Cons	ervation Datab	ase				& Travel
Name: Alaska Natural Heritage Program							DETAIL

Name: Alaska Natural Heritage Program

Prepared: April 10 2000

2001 EXXON VALDEZ TRUS

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October 1, 2000 - September 30, 2001

Contractual Costs:			Proposed
Description			FY 2001
		Contractual Total	\$0.0
Commodities Cost	ts:		Proposed
Description			FY 2001
	· · ·		
		Commodities Total	\$0.0
	Project Number:		
FY01	Project Title: Synthesis of spill damaged resource information i	nto Co	mmodilion
	the Biological Conservation Database		
	Name: Alaska Natural Heritage Program		DETAIL
Prepared: April 10 2	2000 L		

2001 EXXON VALDEZ TRUS

October 1, 2000 - September 30, 2001

New Equipment Purchases:		Unit	Proposed
Description of Unit		Price	FY 2001
PC Pentium: cost estimate obtained from University of Alaska	1	2.0	2.0
			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 Equ	ipment Total	\$2.0
Existing Equipment Usage:		Number	
Description		of Units	
PC: Windows		2	
PC: Mac for Web work		1	
HP color LaserJet printer		1	
HP series E color plotter		1	
			and the second
			·读中 1 全市。
Project Number:		F	ORM 4B
FV01 Project Title: Synthesis of spill damaged resource information	ation into	E	quipment
the Biological Conservation Database			
Name: Alaska Natural Heritage Program			

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Evaluation of Oil Remaining in the Intertidal from the Exxon Valdez Oil Spill

Project Number:	01 <u>54</u> 3 RECEIVED
Restoration Category:	Research and Monitoring APR 1 4 2000
Proposer:	Jeffrey W. Short NMFS, Auke Bay Laboratory ABL Program Manager: Dr. Stan Rice NOAA Program Manager: Bruce Wright
Lead Trustee Agency:	NOAA
Cooperating Agencies:	Alaska Department of Environmental Conservation Alaska Department of Natural Resources Alaska Department of Fish and Game U.S. Forest Service
	U.S. Geological Survey
Alaska Sea Life Center:	No
Duration:	3 years
Cost FY01:	Phase 1: \$ 23,000 Phase 2: \$ 500,000
Cost FY02:	\$ 500,000
Cost FY03:	\$ 22,000
Geographic Area:	Prince William Sound, Gulf of Alaska
Injured Resource/Service:	Intertidal communities, Sediments

ABSTRACT

This project will assess the amount of oil remaining from the *Exxon Valdez* Oil Spill on shorelines within (phase 2) and outside (phase 3) Prince William Sound.

INTRODUCTION

Oil from the March 1989 Exxon Valdez oil spill (EVOS) has been surprisingly persistent on some beaches. At the end of the 1992 cleanup season, natural processes were expected to disperse most of the oil remaining on shorelines. However, relatively un-weathered oil remains today at a number of locations that were heavily oiled initially, and protected from dispersion by storm-generated waves. The extent of the remaining oil is unknown, and this uncertainty engenders public and scientific concerns about the effects the oil may continue to have on humans and on fauna that may become exposed to the oil either directly or indirectly. The project proposed here seeks to address these concerns by providing a quantitative estimate of the amount of oil remaining. This estimate will inform any assessment of the significance of the amount of oil remaining, and including whether further oil removal efforts are warranted.

Estimating the oil remaining on beaches affected by the EVOS presents in a cost-effective manner presents a considerable challenge. Previous attempts to address this problem have mainly relied on Shoreline Assessment Cleanup Teams (SCAT), consisting of field teams performing comprehensive foot-surveys of impacted beaches. Although this approach may be useful for directing cleanup efforts immediately following a spill, it is less appropriate for producing a quantitative estimate of remaining oil, especially long after a spill when most oil remains obscured from casual view. Instead, a stratified random/adaptive sampling design will be developed, which will concentrate sampling effort in areas where oil is known to persist, while allocating some effort to discovering oil in areas where persistence is uncertain. This approach will guarantee a credible minimum estimate of remaining oil, and will provide a confidence interval for the most likely amount remaining throughout the affected region. This information is needed to predict oil persistence into the future, and to determine associated risks to vulnerable biota.

This project will focus on oil remaining on beaches inside PWS during FY01, but a follow-up assessment of oil remaining outside PWS is included as a subsequent phase of the project to be considered for FY02-FY03. Previous Trustee-funded projects have examined oil persistence along the Kenai-Alaska Peninsula coastlines in 1999 (Project 99495), and in the vicinity of Kodiak Island in 1995 (Project 95027). These studies confirmed the persistence of localized oil, but only provided minimum estimates of the extent of oil remaining. The same rationale for evaluating the extent of remaining oil inside PWS therefore applies to the spill area outside PWS as well.

This project will be divided into three phases. Phase 1 is development of the sampling design to be applied to the study area. Design alternatives will be developed during summer 2000 and presented at a workshop in October 2000 for consideration by peer-reviewers, trustee agency representatives, and other stakeholders. Phase 2 is execution of the adopted sampling design inside PWS during spring/summer 2001. Phase 3 is execution of a modified sampling design based on the experience of phase 2, applied to the spill area outside PWS during spring/summer 2002. The process and issues for sampling design development and adoption (phase 1) are addressed in the remainder of this proposal. The detailed project descriptions for phases 2 and 3 are contingent on the results of preceding phases. The projected project amounts of \$500,000

for each of phases 2 and 3 are approximations that will be modified based on results of preceding phases.

NEED FOR THE PROJECT

A. Statement of Problem

Although the persistence of relatively un-weathered oil is clearly established on some beaches 10 years following the incidence of the EVOS, the cumulative extent of remaining oiled beach is controversial. One estimate places the area of beach that remains contaminated by oil at less than 450 m^2 (Page 1998), but the basis for this claim has not been presented. Other studies suggest more extensive contamination (Brodersen et al. 1999, Hayes and Michel 1999, Irvine et al. 1999). These latter studies have often found relatively un-weathered oil in the upper intertidal of beaches that are heavily armored by boulders and beneath mussel beds, in locations that were heavily oiled initially. The frequency that these remaining oil patches are encountered suggests that the area affected may exceed 450 m^2 , perhaps substantially.

The extent of oil remaining on these beaches defines the lack of recovery for these sediments. The remaining oil may also impede the recovery of injured species that are still exposed to it. This exposure includes direct contact with water contaminated by the remaining oil, or indirect contact through ingestion of prey contaminated by the oil. The fact that the remaining oil is often so un-weathered indicates the oil is still a potent source of toxic polycyclic aromatic hydrocarbons (PAH), which elicit a manifold of adverse effects on biota exposed to them. These species may include black oystercatchers, clams, intertidal communities, mussels, Pacific herring, pink salmon, sea otters, subtidal communities, and harlequin ducks. In addition, subsistence uses, passive uses, recreation and tourism may also be impaired because of speculation that the area remains too contaminated for these uses.

B. Rationale

If a sufficiently large area of beach remains contaminated by oil, then ensuing concerns about the potential for on-going biological effects may prompt additional cleanup effort. The plausibility of oil-exposure linkages connecting fauna at higher trophic levels with oiled habitat, as well as the propriety of additional restoration options depend on an assessment of the amount of oiled habitat remaining in the spill area. Conversely, without this assessment, the public will continue to wonder how much of the spill area remains contaminated, and will likely make inappropriate decisions regarding resource use based on misperceptions about the extent of remaining oil. Also, scientists evaluating biological linkages to oil exposure will be less able to assess geographic correlation, compromising those studies.

Assessment of the extent of remaining oil should be done now to maximize benefits that may derive from the expected reduction in uncertainty regarding the extent of this oil.

C. Location

This project will be undertaken in Prince William Sound (PWS) during 2001, and in the spillaffected region outside PWS the following year contingent on results from PWS and funding approval. Communities directly affected by this project inside PWS include Cordova, Chenega, Tatitlek, Valdez and Whittier, and outside PWS include English Bay, Kodiak, Homer, Ouzinkie, Port Graham, Port Lions, Seldovia, and Seward. Benefits of the project will accrue especially to participants in subsistence, commercial fishing, and scientists studying resource recovery in the region, and more generally to the public at large.

COMMUNITY INVOLVEMENT

Community involvement is crucial to the success of this project. Residents of the impacted area may have local knowledge of oil persisting in physical settings and locations that are not known to the investigators of this project. Communication of this knowledge will improve the accuracy of the assessment of oil remaining. Communities in the region will be canvassed, especially the native and commercial fishing communities, during fall 2000 and winter 2001 to identify potential additional sampling compartments. This will involve presentation to these communities of a summary of where oil is presently known to persist, and an appeal for residents to identify any additional situations where oil has been recently observed. The final sampling design will address and incorporate these situations, to reduce the chance that significant repositories of oil remaining in the area are overlooked.

Local hire for field support and sampling will be used whenever possible during the second phase (sampling) of this project. This will likely include vessel and aircraft charters, and possibly some labor during sample collection. However, most of the labor will require specialized field sampling skills that will be furnished by the participating agencies.

Results of this project will be summarized as a map depicting locations and extent of remaining oil discovered, together with a report summarizing the statistical estimate of the amount of remaining oil. These materials will be accompanied by a press release announcing these findings to the media for general distribution, and public presentations will given in Anchorage, Cordova and Valdez to facilitate public review and commentary on the findings.

PROJECT DESIGN

A. Objectives

This project has 2 objectives:

1. Produce a point and interval estimate of the amount of oil remaining inside PWS, and characterize the weathering state of the oil remaining in each of the strata sampled.

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2. Produce a point and interval estimate of the amount of oil remaining outside PWS, and characterize the weathering state of the oil remaining in each of the strata sampled.

B. Methods

1. Phase 1

The goal of phase 1 is to produce a final sampling design to be implemented in the field the following spring. A set of design alternatives will be developed by Auke Bay Laboratory staff during summer 2000 for presentation and consideration at a workshop to be held during October 2000. These design alternatives will be presented at this workshop to the Trustee staff, chief scientist, and peer-reviewers, for evaluation of suitability and cost-efficiency. Alternate designs suggested by other workshop participants may also be considered and compared. The decision to pursue phase 3 will also be resolved at this workshop. Final refinements to the design selected at the end of this workshop, along with a detailed study plan for phases 2 and 3 of this project will be presented to the Trustee Council for approval in December 2000.

Proposed sampling designs will need to address how remaining oil will be quantified, how sampling effort will be allocated, and the expected precision of the overall estimate of oil remaining (i.e. a power analysis). Two examples of how oil might be quantified include measurement of the surface area of beach where oil is visible on or beneath the surface, and measurement of the volume of oil recovered beneath a unit surface area of beach. Other metrics may be proposed, provided they are sufficiently well defined to permit quantitative extrapolation to the whole stratum sampled, along with an estimate of precision.

Choice of metric will define what is meant by "extent of remaining oil" in this study, and will strongly affect the precision of the final estimate. This is because measurement of beach surface area beneath which oil is visible is less expensive than measurement of the volume of oil per unit beach area, so more observations of the former may be obtained per unit cost. This increases the precision, but volume measurements would provide more information on likely persistence into the future. Choice of the metric will therefore require careful consideration and resolution at the October workshop, in order for this study is to provide a meaningful estimate of "remaining oil" that satisfies the concerns of the stakeholders.

The allocation of sampling effort will need to address 3 categories of sampling situations, with multiple sampling strata within each category: (1) locations of known oil, and tracked through time; (2) locations of known oil in 1989, but not tracked; and (3) other locations suggested by local residents with local knowledge. The first category includes the set of locations where oil is known to persist, based on recent published scientific investigations or on continuing monitoring studies. This set comprises at least 3 geomorphological settings (strata), viz., oil trapped beneath cobble-boulder armored

beaches in the upper intertidal, oil trapped beneath mussel beds, and oil associated with fine grained sediments in protected bays (e.g. the "death marsh" in Bay of Isles). The locations where oil persists within this category are well known, so the sampling design does not need to deal with great uncertainty of oil location. It is expected that sampling within this category is certain to produce a minimum non-zero estimate of oil remaining, so a substantial portion of sampling effort will probably be allocated here.

The second category of sampling comprises PWS beaches that were heavily oiled in 1989, have the same geomorphological characteristics as the strata of category 1, but where oil persistence has not been verified. The third category comprises strata identified by local knowledge to contain persistent oil, and which are not already included in category 1. The sampling approaches that are appropriate for these different categories vary, and one of the sampling design challenges will be to provide an efficient basis for allocating sampling effort among these categories.

Some form of adaptive sampling (Thompson Ref.) will likely be required, first to distribute sampling effort among the 3 categories, and again to distribute effort within each category and stratum. To distribute effort among categories, a preliminary assessment of how frequently oil is detected within each strata of each category will provide a basis for distributing the remaining sampling effort, to maximize the precision and accuracy of the overall estimate of oil remaining. Within specific sampling strata, for example oil under armored beaches at known locations, an adaptive sampling design will probably still be necessary to cope with the patchy and infrequent occurrence of oil there. At the stratum-specific level, adaptive sampling basically involves sampling to assess the frequency of oil patch occurrence, followed by sampling within detected patches to estimate the patch size distribution. These estimates can be combined to estimate the amount of oil present in the sampled stratum as a whole.

Regardless of the design proposed, an analysis of the sampling design power to measure the extent of remaining oil as a function of sampling and analysis cost must be included with each design candidate, to facilitate cost/precision comparisons among alternative designs.

A small number of samples (~24) from strata where most of the remaining oil is detected will be analyzed by GCMS to verify the presence of EVO and to determine the quantitative weathering state (S&H 1997). The weathering state indicates the amount of remaining toxicity associated with the oil, and will contribute to estimating future oil persistence.

To accomplish phase 1 of this project, each participating agency (see sec. C below) will be provided \$2K to support preparation for and attendance at the Anchorage workshop in October 2000. Also, two geomorphologists, Drs. James Gibeaut and Dan Mann will each be provided \$2K support to attend this workshop. These two individuals have participated in previous related Trustee projects. Travel support for 5 attendees from outside Anchorage will also be provided. Selection of the final design and participants in

phase 2 and 3 (execution) of this project will be identified at this workshop.

2. Phases 2 and 3

Because the execution phase of this project depends so heavily on the outcome of phase 1, the detailed project description for phases 2 (FY01) and 3 (FY02) are deferred to the end of the October workshop.

C. Cooperating Agencies, Contracts and Other Agency Assistance

Cooperating agencies for this project include the Alaska Department of Environmental Conservation, the Alaska Department of Natural Resources, the Alaska Department of Fish and Game, the U.S. Forest Service, and the U.S. Geological Survey. Initially, contracts to Drs. James Gibeaut and Dan Mann of \$2K each will be provided to support attendance at the Anchorage meeting in October 2000.

SCHEDULE

A. Measurable Project Tasks for FY01

FY01:

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Oct 15 (approx):	Convene Anchorage design planning workshop.
Oct 30:	Submit detailed project description for phase 2 to trustee peer-reviewers
Nov 30:	Incorporate peer-review comments into final DPD for funding
	consideration by the Trustee Council in December. (End Phase 1)
Nov 30 – Apr 15:	(Phase 2) Present summary of known remaining oil deposits inside PWS
	and canvas communities for local knowledge of persistent oil. Identify
	sampling strata locations within each sampling category, based on existing
	maps of shoreline oiling and beach geomorphology.
Apr 15 – May 30:	Perform preliminary sampling to apportion final sampling effort.
Jun 1 – Sep 30:	Collect field samples.

B. Project Milestones and Endpoints

Schedule:

FY02	
Sep 30 – Apr 15:	Analyze phase 2samples.
Apr 15 – Sep 30:	Prepare final report and journal publication for phase 2. Objective 1 met at this time.

Phase 3:	
Sep 30 – Apr 15:	Present summary of known remaining oil deposits outside PWS and
	canvas communities for local knowledge of persistent oil. Identify

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Apr 15 – May 30: Jun 1 – Sep 30:	sampling strata locations within each sampling category, based on existing maps of shoreline oiling and beach geomorphology. Perform preliminary sampling to apportion final sampling effort. Collect field samples.
FY03 Sep 30 – Apr 15: Apr15 – Sep 30:	Analyze phase 3 samples. Prepare final report and journal publication. Objective 2 met at this time.

C. Completion Date

September 30, 2003

PUBLICATIONS AND REPORTS

No publications will be submitted in FY01. It is anticipated that 2 research papers will be submitted to peer-reviewed scientific journals reporting results for phases 2 and 3 in FY02 and FY03 respectively.

PROFESSIONAL CONFERENCES

None Planned for FY01.

NORMAL AGENCY MANAGEMENT

If the oil spill had not occurred, neither NOAA nor the cooperating agencies would be conducting this project.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project will be coordinated through participation of the cooperating agencies. Formal coordination will commence at the proposed Anchorage workshop. All of the previous Trustee-funded studies on oil persistence in the spill region have been performed under the auspices of these agencies, and it is presumed that local knowledge is the only significant source of additional information relevant to this project outside these agencies.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

Prepared 4/12/2000

None

PROPOSED PRINCIPAL INVESTIGATOR

Jeffrey W. Short Auke Bay Laboratory, Alaska Fisheries Science Center National Marine Fisheries Service, NOAA 11305 Glacier Highway, Juneau, Alaska 99801-8626 Phone: (907) 789-6065 FAX: (907) 789-6094 e-mail: jeff.short@noaa.gov

PRINCIPAL INVESTIGATOR

Jeffrey W. Short

Education: M.S. (Physical Chemistry)

Relevant Experience:

1989- Present: Established and managed the hydrocarbon analysis facility at ABL to analyze hydrocarbon samples generated by the *Exxon Valdez* NRDA effort (about 20% of these samples were analyzed at ABL).

1989 - 1992: Principal Investigator, Exxon Valdez project Air/Water #3: Determination of petroleum hydrocarbons in seawater by direct chemical analysis and through the use of caged mussels deployed along the path of the oil spill.

1991 - 1996: Principal Investigator, Exxon Valdez project Subtidal #8: Development of computer-based statistical methods for global examination of sediment and mussel hydrocarbon data produced for the Exxon Valdez NRDA effort for systematic bias, and for identification of probable sources of hydrocarbons.

1996 - present: Principal Investigator, Restoration Project 290, Database Management.

OTHER KEY PERSONNEL

1. Jerome Pella, the senior biometrician at the Auke Bay Laboratory, will be consulted during preparation of the sampling design alternatives and associated power analyses.

2. Marianne See, Alaska Department of Environmental Conservation, will facilitate coordination with State of Alaska agencies.

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Prepared 4/12/2000
Brodersen, C.C., J.W. Short, L. Holland, M.G. Carls, J. Pella, M. Larsen, and S.D.Rice. 1999. Evaluation of oil removal from beaches 8 years after the Exxon Valdez oil spill. Proc. 22nd Arctic and Marine Oil Spill Program, Environment Canada, Calgary, June 1999, pp. 325-336.

Hayes, M. O., and J. Michel. 1999. Factors determining the long-term persistence of Exxon Valdez oil in gravel beaches. Mar. Pollut. Bull. 38:92-101.

Irvine, G. V., D. H. Mann, and J. W. Short. 1999. Multi-year persistence of oil-mousse on high energy beaches distant from the Exxon Valdez spill origin. Mar. Pollut. Bull. 38:572-584.

Page, D.S. 1999. Quoted in USA Today March 4, 1999.

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of the field sampling and analyses. This is the budget for Phase 1 only, the planning phase. Estimated costs for Phase 2 is \$500K.

NOAA Contribution: Jeff Short .5 mo@5K, Jeep Rice .25 mo @ 3K for a total NOAA contribution of 8K

FY01

Project Number: 01<u>57</u> PHASE ONE Project Title: Evaluation of Oil in the Intertidal from the EVOS Lead Agency: NOAA FORM 2A MULTI-TRUSTEE AGENCY SUMMARY

Prepared: 4/12/00

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General Administration		\$0.3	FY 2002
Project Total	\$0.0	\$2.3	
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Commodities		\$0.0	
Equipment		\$0.0	LONG RANGE FUNDING REQUIREMENTS
Subtotal	\$0.0	\$2.0	Estimated
General Administration		\$0.3	FY 2002
Project Total	\$0.0	\$2.3	
Full-time Equivalents (FTE)		0.0	
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Project Title: Lower Cook Inlet Salmon Ecology Study

Project Number:	01544	
Restoration Category:	Research and Restoration	
Proposer:	Chugach Regional Resources Commission	on
Lead Trustee Agency:		
Cooperating Agencies:	Port Graham and Nanwalek IRA Counci KBNERR, USFWS	ls , NOAA (NMFS), UAF,
Alaska Sea Life Center:		
Duration:	Two years.	RECEIVED
Cost FY 01:	\$185,800	APR 1 4 2000
Cost FY 02:	\$185,800	EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
Geographic Area:	Lower Cook Inlet/Outer Kachemak Bay	moorma
Injured Resource/Service:	Pink and Sockeye Salmon	

ABSTRACT

This project will improve existing knowledge of the survival mechanisms of pink and sockeye salmon in South Eastern Lower Cook Inlet (LCI). Research will be conducted in order to more clearly define the survival mechanisms of juvenile pink and sockeye salmon smolts as they are out-migrating from the Port Graham and English Bay drainage's (Port Graham Subdistrict) on their way to the Gulf of Alaska. Out-migrating salmon smolts will be tracked, captured and sampled for growth, stock origin (thermal marks, coded wire tags, scale samples), stomach contents (for prey species identification) and timing (days since release or out-migration) in order to gain a more detailed understanding of the key survival mechanisms in the early marine life of these juvenile salmon.

INTRODUCTION

The study will attempt to describe possible limiting factors of the marine survival of these two important salmon species. Both natural and anthropogenic influences and fluctuations will be reviewed for potential impacts. Pink and sockeye salmon are essential components of the subsistence and commercial fisheries in the Port Graham and English Bay drainage's. It is important for local village subsistence and commercial users and resource professionals as well as other resource agencies to gain a better understanding of the early marine dynamics of each species as well as the interrelationships with and within the ecosystem level processes that effect and constrain them. Due to the major social, ecological and economic roles of pink and sockeye salmon stocks in the study area, the LCISES research plan will focus on identifying critical ecosystem level processes that affect the survival of these two species. The study will establish important baseline information to enable potential determinations of the extent of possible survival limitations based on natural system fluctuations as well as potential exposure, sensitivity and vulnerability to oil pollution from residual EVOS oil and Oil and Gas Industry Activities in Cook Inlet.

By carefully and systematically documenting and analyzing the interactive variables which most significantly affect this valuable local resource, important decisions regarding restoration and or enhancement practices can be made with a higher level of confidence that has not been previously possible. The impacts of anthropogenic activities will become potentially measurable once the natural ecosystem constraints are more fully understood. The study will also facilitate intelligent forecasting capabilities for these two local species.

The study will document the growth rate and outmigration timing of these two important salmon species in the spring of 2001 and 2002. Opportunistic sampling of smolts will occur when feasible with hopes of learning important staging areas and preferred beach habitat for both species. Plankton and sea surface temperature records will be collected for possible future correlations with observed growth. Sampling will include CTD, 20 meter vertical plankton tows and chemical measurements. Both pink and sockeye salmon are essential components of the subsistence and commercial fisheries in the Port Graham and English Bay drainage's (Port Graham Subdistrict).

NEED FOR THE PROJECT

A. Statement of Problem

The salmon runs to the Port Graham area are at low levels, partly as a result of the *Exxon Valdez* oil spill. Many scientific studies have occurred throughout the spill area including some major salmon ecology and ecosystem work such as the EVOS funded Sound Ecosystem Assessment done in Prince William Sound. Much has been learned about the constraining natural and anthropogenic factors for pink salmon in PWS and South East Alaska (APRISE). While this data is extremely valuable and useful, it is very important to perform similar work in Lower Cook Inlet and specifically in the Port Graham Subdistrict area waters. Local residents and resource personnel of Port Graham and Nanwalek can offer traditional and in depth knowledge that is invaluable in defining and answering important research questions.

B. Rationale/Link to Restoration

The main premise behind this study is that the constraining processes affecting pink and sockeye salmon production (both natural and anthropogenic) can be described in sufficient detail such that they can be much more clearly understood, explained and possibly even predicted when analyzed using many other important EVOS sponsored data and models. Information about the variety of relationships influencing this delicate balance will help assess, describe and document trends and clarify additional research needs.

The importance of these two damaged species (pink and sockeye salmon) to the Native villages in the oil spill area has been recognized by the EVOS Trustee Council in its November 1994, *Exxon Valdez Oil Spill Restoration Plan*. This project will help enable Port Graham Village and Nanwalek fisheries and natural resource users and professionals as well as other professionals and resource agency personnel, to achieve a much higher level of understanding regarding the controlling aspects of the early marine environment for these fish. It is beneficial for the whole Cook Inlet area and State of Alaska to protect these two salmon species in the event of another spill with the upcoming Oil and Gas Industry Activities in the Cook Inlet area.

In order to identify the physical and biological processes that control the ultimate marine survival of these two species, it is essential to apply this type of measurement, observation and traditional ecological knowledge approach to distinguish between natural trends and human caused influences.

COMMUNITY INVOLVEMENT

The Lower Cook Inlet Salmon Ecology Study is a community-based research and monitoring project that will use village natural resource and environmental specialists and traditional knowledge representatives and elders to participate in and actually conduct the research and sampling efforts. Native Village residents in this part of the spill area are very concerned about the long-term health and sustainability of their valuable fisheries resources. Their commitment to responsible stewardship and management of their own lands and resources is deeply ingrained in their way of life and culture and has been for many tens of thousands of years. These communities are actively involved in natural resource management programs at the local level to ensure the long-term health of these two and other injured oil spill species. Each village has a CRRC tribal community facilitator position that is part of CRRC's region wide natural resource program. Port Graham and Nanwalek continually advocate for the responsible resource management the lands and water bodies within and surrounding their vast traditional use areas.

PROJECT DESIGN

A. Objectives

Objectives/Hypotheses

The main objective of this project is to define observed growth, feeding behavior, stomach content and outmigration behavior and timing during the early life history of pink and sockeye salmon originating from the Port Graham and English Bay watersheds.

The specific study plan goals are as follows:

- (1) Establish a comprehensive understanding of key interactive processes (both marine and freshwater) that regulate levels of pink and sockeye salmon production from the Port Graham Subdistrict.
- (2) Use this information to more accurately understand the production limitations and mechanisms of pink and sockeye salmon in the study area.
- (3) Develop a predictive matrix for tracking and potentially forecasting fishery responses to specific variables.
- (4) Evaluate and define various levels of ecosystem disturbances, both natural and anthropogenic that would potentially cause limitations above and beyond natural fluctuations.
- (5) Relate all program goals and format data to facilitate and interact with existing EVOS studies as well as other relevant studies and programs (both ongoing and concluded).
- (6) Display all project results within a state of the art, visualization medium that will most clearly reveal the findings of this study being careful to distinguish known verified data against more subjective results.

The focus of this study is on the ecosystem structure and functions that influence both early and late life stages of pink and sockeye salmon. Specific questions regarding how survival to adulthood is influenced will be addressed, including: predation on juveniles, near shore temperature and weather, food availability, migrational patterns and possible pollutant exposure.

Major hypotheses include:

- (1) Adult pink and sockeye survival is primarily dependent on early marine survival of juveniles
- (2) Juvenile survival is primarily growth rate dependent and,
- (3) This growth rate dependency is directly related to maximum achievable burst speed for successful predator evasion.
- (2) Growth rate is primarily temperature and to a lesser extent food limited, and
- (3) Variations in predatory composition and abundance further limit survival
- (4) Warmer than average temperatures benefit juvenile salmon but may disrupt returning adult behavior.
- (5) Chronic exposure to threshold levels of pollutants further limit salmon fry survival and may confuse imprint details for returning adults.

The primary avenues of investigation are:

- Juvenile pink and sockeye salmon growth and migration and
- Predator/prey studies, to identify preferential prey, critical relationships, and survival windows Ecosystem modeling and visualization, to develop mean of assessing likely effects of perturbations to the ecosystem.
- Near shore water column analysis for prey composition and abundance and chemical "purity"

- Review and coordinate with other relevant studies to determine potentially beneficial information, resources and logistics.
- Provide training for village project participants in sampling procedures

Methods/Analyses

Water and zooplankton samples will be collected from the entire water column in the shallow near shore regions depending on the abundance of associated deep and near surface zooplankton assemblages. Sampling will include CTD, ADCP, 20 meter vertical plankton tows and chemical measurements. Water chemistry samples will be collected following strict standardized procedures and sent to a reputable lab in Anchorage for analysis with splits potentially going to an agency or university lab.

In order to determine growth and survival rates specific to English Bay sockeye and Port Graham pink salmon juveniles, a percentage of pink fry and sockeye smolts will be Coded Wire Tagged and all of the enhanced production will be marked with thermally induced bands on the otitliths. This will facilitate the ability to distinguish between the wild and enhanced groups. Fry and smolt migration will be monitored and evaluated by tracking in boats and skiffs, using beach seines, fish attractant solutions, capturing fish and running them through a Northwest Marine Technologies Micro Wire Tag Quality Control Device which separates tagged and untagged individuals and counts the tagged ones.

Nearshore Sampling

Nearshore areas will be sampled from March through late August. The nearshore areas will be sampled by a 40 meter beach seine at a depth less than 4 meters and within 15 meters of shore. Five sites will be established for each species. A variable mesh gill net will be used for the nearshore predator evaluations. Visual records will be cataloged in chronological order as to basic site weather, predatory sightings, juvenile behavior etc.. For the sockeye, the sites will most likely be at or near Russian Pt. Shoreline, the 3rd set net site from the river mouth on the south shore, Flat Island, Point Bede and Point Adams. For the pinks the capture sites will likely be at Duncan Slough, old cannery cabin beach, Coal Cove, Passage Island and a site along the shore between Dangerous Cape and Point Pogibshi. All nearshore sample sites will be cooperatively run with effectively ten useful sites for both the sockeye and pink juveniles.

Each site will be sampled for migrating fry or smolts and predation twice a week from March through August.

Upon arrival at each site the following steps will be taken:

- 1. The variable mesh gill net will be deployed immediately upon arrival.
- 2. Beach seine for juveniles if fry or smolt are easily located and in sufficient abundance, otherwise go on with other sampling and keep an eye out for juveniles.
- 3. Deploy CTD at the deepest spot within the established site boundary (mark with small buoy)
- 4. Take surface, 5 meter and 10 meter water samples for laboratory chemical analyses.
- 5. Take and record Sechi Disk reading.
- 6. Take and record surface water temperature, Dissolved Oxygen and Salinity.
- 7. Take three replicates of twenty meter vertical plankton tows.

- 8. Beach seine juveniles if not already done.
- 9. If the catch of target juvenile salmon is more than 500 fish, the catch will be subsampled and weighed for enumeration with 100 juveniles retained for sample processing.
- 10. All juveniles samples will be kept separate, placed on ice in whirl-pac bags, marked for capture location, method, tide, habitat and weather and will be taken back live to the field lab for blotted wet weight, fork length sampling, stomach content sampling/ quantification and tissues preservation.
- 11. Pull variable mesh gill net, remove catch, fix stomachs and prepare for transport back to field lab where samples will be processed and quantified.

Offshore Sampling

Two offshore sample sites will be established for the entire program. The exact location of the offshore sites will be determined by consulting with experts such as village elders and fishers, Ted Cooney (retired UAF), Alex Werthiemer (NMFS), and local ADF&G and study project personnel. The offshore sites will be within 100 meters of and oriented to the shoreline with the transect lines covering depths of 10 to 25 meters. Normal daylight tows will be made once a week from late April to late September using a 6.1 meter wide by 3.0 meter deep surface trawl. Tows will be done at night, once a month instead of the normal daytime tow.

Two replicate tows will be made at each site using two boats (probably a contracted seine boat and seine skiff) and a trawl speed of 65 to 70 cm/s for 10 minutes. When the tow is complete a third boat (skiff) will be used to close the cod end of the trawl by retrieving and pulling a trailing purse line. The cod end will be hauled into a tote on the large vessel and the fish capture will be speciated, counted and checked for tags by passing them through the QCD. Fish will be processed as specified in the nearshore sample methods above, if the catch of target juvenile salmon is more than 500 fish, the catch will be subsampled and weighed for enumeration with 100 untagged juveniles retained.

For both near shore, offshore and any random non site samples collected the number of days in transit for pink and sockeye salmon juveniles will be determined from recoveries of tagged and untagged fish. For the tagged fish the number of days since release will be plotted along with the new length and weight. Residence and migration timing of untagged fish will be estimated using catch per unit effort (CPUE) from the normal station sampling. Growth rates will be determined for measured changes in length, weight and condition factors over the period of time since the fish was released. Growth will be described as an exponential model,

$$W_2 = W_1 * e^{bt}$$

where t is the time in days, b is the daily growth rate, and W_1 and W_2 are fish weights at the beginning and end of the time period. Using this model, weight can be expressed as a linear function of time,

$$Ln(W_t) = bt + In(W_0)$$

Linear regression will be used to fit the natural log of observed weight to this equation. The computed slope of the regression equation will represent the specific growth rate over the interval, which when multiplied by 100, can be expressed as percent body weight gained per day.

A spatial, migratory pattern model will be developed to calculate estimated travel trajectories and staging area residencies based on all data sets.

For large smolts initially presumed to be enhanced fish, the model will be used to determine estimated growth rates from the time the tag code was released to the time the last tagged fish are sampled. For fish initially considered un enhanced wild stocks, the model will be used to determine growth for both the nearshore and offshore samples. Otilith samples will be collected from all fish retained for sampling and sent to the ADF&G or DIPAC otilith lab in Juneau for processing. This information will be used to determine whether the untagged fish is enhance or wild and to any degree possible which natural system the fish originated from if wild.

The specific study plan goals are as follows:

- 1. Conduct a literature review for existing information relating to various levels and components of ecosystem fluctuations that control the marine survival responses of pink and sockeye salmon in Alaska and Canadian marine environments.
- 2. Characterize preferred marine habitat (water quality, preferred beach types, plankton species diversity and abundance) in which the pink and sockeye salmon are found during the first three months of life in lower cook inlet.
- 3. Document observed growth rates and outmigration timing of wild and enhanced fish since release.

Major hypotheses:

- 1. Outmigrating juvenile pink and sockeye salmon can be successfully captured and sampled for growth and outmigration timing in South Eastern Lower Cook Inlet..
 - 2. Adult pink and sockeye survival is primarily dependent on early marine survival of juveniles
 - 3. Juvenile survival is primarily growth rate dependent.
 - 4. Growth rate dependency is directly related to maximum achievable burst speed for successful predator evasion.
 - 5. Growth rate is primarily temperature and to a lesser extent food limited, and
 - 6. Variations in predatory composition and abundance further limit survival
 - 7. Chronic exposure to threshold levels of pollutants further limit salmon fry survival.

The primary avenues of investigation are:

- Juvenile pink and sockeye salmon growth and migration
- Predator/prey studies, to identify preferential prey, predatory significance and relationships, and survival windows.
- Ecosystem modeling and visualization, to develop a means of assessing likely effects of perturbations to the ecosystem.
- Near shore water column and fish tissue analysis for prey composition and abundance and chemical "purity"

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- Review and coordinate with other relevant studies to determine potentially beneficial information, resources and logistics.
- Provide training for village project participants in ecological research procedures.

Methods/Analyses

The literature review will be conducted primarily by internet and bulletin board searches. Particular emphasis will be placed on procedures and equipment used in juvenile salmon capture projects in near shore marine waters of Alaska and Canada. Additional information will be collected regarding study plans, results and methodologies for salmon ecology studies conducted in the early marine environment. This information will be summarized and used in the "where do we go from here" section in the conclusion of the final report.

The early marine habitat will be characterized by documenting smolt abundance, beach habitat, depth and water quality of observed staging areas. The concentrations and apparent staging duration of smolts will be the key factor in determining principle staging areas. These habitats will be described using similar zonation and descriptive terminology used in the APPRISE study done in South East Alaska. Basic water quality sampling will be conducted including Salinity, Temperature and Dissolved Oxygen measurements (surface to 3 meters) and sechi depth readings.

In order to document growth rates and outmigration timing of the pink and sockeye smolts, two to four fixed "offshore" sample sites will be established for fixed tows with the trawl gear. These sites will be used primarily to systematically sample smolt "traffic" through a specific coastal segment. The fixed sites will serve as standardized sampling areas that the smolts continually pass through. This will facilitate achieving a sense for the migrational timing through the area by comparing catch numbers and compositions through time. Opportunistic sampling (trawl sets) will also be conducted when large concentrations of smolts are observed. The exact location of the offshore sites will be determined and probably modified based on early initial tow success, observed fry concentrations and consulting with experts such as village elders and fishers, Bill Smoker and Ted Cooney (UAF), Alex Werthiemer (NMFS), and local ADF&G staff and project personnel. The offshore sites will be within 100 meters of and oriented to the shoreline with the transect lines covering depths of 10 to 25 meters. Normal daylight tows will be made every ten days from late April to late September using a 6.1 meter wide by 3.0 meter deep surface trawl. Once a month tows will be done at night instead of the normal daytime tow.

Two replicate tows will be made at each site using two boats (probably a contracted seine boat and seine skiff) and a trawl speed of 65 to 70 cm/s for 10 minutes. When the tow is complete a third boat (skiff) will be used to close the cod end of the trawl by retrieving and pulling a trailing purse line. The cod end will be hauled into a tote on the large vessel and the fish capture will be identified to species, counted and sampled. One hundred juveniles will be sampled for length, weight and condition factor and then retained and preserved for stomach sampling (formalin). If the catch of target juvenile salmon is more than 500 fish, the catch will be subsampled and weighed for enumeration. Some of the sockeye smolts will be coded wire tagged fish from the enhancement project.

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For offshore and any random non site samples collected, the number of days in transit for pink and sockeye salmon juveniles will be determined from recoveries of marked fish. Growth rates will be determined for measured changes in length, weight and condition factors (relationship between length and weight) over the period of time since the fish were released. Migratory patterns and timing information will be plotted on maps and charts (GIS plots and marine charts) to calculate estimated travel trajectories and staging area residencies based on all data sets. Opportunistic sampling will provide additional migratory detail necessary to establish migration routes and timing.

Logistics

The program goals will be accomplished as follows:

1. Literature Search

This initial segment will be collected primarily by electronic means (see methods section) and will focus on collecting pertinent literature and data which will facilitate this programs objectives and be used for the conclusion section of the final report.

2. External Project Coordination

Any other relevant projects will be identified and appropriate lead personnel will be contacted with avenues of cooperation and coordination being explored and developed as appropriate.

3. Personnel Acquisition and Structuring

The Principle Investigator (PI) and Co-Investigators (CI's) will be set up with the appropriate supportive staff structure.

4. Pink and Sockeye Salmon Early Life History

- Local Public Preliminary Presentation and Traditional Review/Input Meeting
- Existing Data Assessment and Consolidation
- Establish Offshore Sites
- Fry/Smolt Capture and Sampling
- Fry/Smolt Predation Sampling
- Data Acquisition and Synthesis
- Secondary Presentation and Traditional Review/Input Meeting
- Draft Preliminary Report (DPR)
- Initial Peer Review and Comments for DPR
- Draft Final Report

Key Personnel

Ted Cooney	Proposed Principle Investigator
Alex Wertheimer	Project Advisor
Paul McCollum	CRRC Project Coordinator
Laurie Daniels	Field Project Supervisor
Violet Yeaton	Port Graham Environmental Specialist
Tom Evans	Nanwwalek Environmental Specialist
Nancy Yeaton	CRRC Nanwalek Community Facilitator
Walter Meganick Jr.	CRRC Port Graham Community Facilitator
Field Assistants (2)	Project Research Assistants
References

Barnard, D. R. 1981. Prey relationships between juvenile pink and chum salmon in Prince William sound, Alaska. M.S. Thesis, University of Alaska, Fairbanks. 72 pg.

Barraclough, W.E., D.G. Robinson, and J.D. Rulton. 1968. Data record. Number, size composition, weight, and food of larval and juvenile fish caught with a two boat surface trawl in Saanich Inlet, 23 April - 21 July 1968. Fish. Res. Bd. Can. MS Rep. 1004. 305pg.

Mortensen, D.G. and A. C. Wertheimer. 1988. Residency and growth of juvenile pink salmon (Oncorhynchus gorbuscha) in Auke Bay. 1987 APPRISE report.

Jewett, S.C. and Stark, T.C. 1994. Food and habitat utilization of juvenile hatchery pink salmon (<u>Oncorhynchus gorbuscha</u>) in Port Valdez, Alaska: 1989-92. 124 pg.

Willete, T.M. and Cooney, R.T. 1996, Processes affecting the survival or juvenile pink salmon in Prince William Sound. Sound Ecosystem Assessment.

Project Time-line 2001 (FY 01) to 2002 (FY 02)									
	Est. Start	Est. Date	lrst	2nd	3rd	4th			
Project Activities	Date	Finished	Quarter	Quarter	Quarter	Quarter			
Review and Verify Equipment and Supplies Needed	March 15	May 1							
Order Equipment and Supplies	April 1	May 15							
Literature Search	April 1	June 1							
External Project Coordination	April 1	June 1							
Personnel Acquisition and Structuring	April 1	May 15							
Early Life History Sites Established	· · · · · · · · · · · · · · · · · · ·								
Preliminary Presentation and Traditional Review/Input Meeting	May 1								
Existing Data Assessment and Consolidation	April 1	May 15							
Early Life History Sampling	May 1	Sept. 30							
Secondary Presentation and Traditional Review/Input Meeting	June 15								
Data Acquisition and Synthesis	Sept. 1	Dec. 15							
Water Quality and Fish Tissue Analysis, Sites and Strategies	Year 2	2002							
Water Column Sampling	April 1	Sept. 30							
Fish Tissue Sampling	May 1	Sept. 30							
Data Acquisition and Synthesis	Sept. 1	Dec. 15							
Presentation and Traditional Review/Input Meeting	Dec. 20								
Reports and Data Analysis									
Data Compilation	May 1	Nov. 15							
Statistical Analysis and Visualization of Data	May 1	Nov. 15							
Multi-Dimensional Matrix Input	Aug. 1	Nov. 15							
Mapping and Plotting	Aug. 1	Nov. 15							
Statistical Processing	Aug. 1	Nov. 15							
Visualization Processing	Aug. 1	Nov. 15							
Presentation and Traditional Review/Input Meeting	Nov 15								
Draft Preliminary Report (DPR)	Dec 15								
Initial Peer Review and Comments for DPR	Dec 15	Jan 15							
Draft Final Project Report	Jan 15								
Final Project Report Completion	Feb.15								

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October 1, 1997 - September 30, 1998

	Authorized	Proposed						
Budget Category:	FY 2000	FY 2001						
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Personnel		\$98.8						
ravel		\$5.8						
Contractual		\$37.0						
commodities		\$1.0				國家和自己的問題		
quipment		\$19.0		LONG RA	NGE FUNDING	REQUIREM	ENTS	
Subtotal		\$161.6		Estimated				
ndirect		\$24.2		FY 2002				
Project Total		\$185.8		\$185.8				
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Dollar amounts are	shown in thous		Dollar	amounts are she	own in thousand	s of dollars.		
ther Resources		\$178.7	:	\$180.0				
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Prepared: 4-11-00	L							
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	Position Door	ription			Budgeted	Coste	Overtime	Fropo:
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October 1, 1997 - September 30, 1998											
Ted Cooney Alex Wertheimer Paul McCollum Laurie Daniels Violet Yeaton Tom Evans Nancy Yeaton Walter Meganick Jr. Field Assistants (2)	Principle Investigator Project Advisor CRRC Project Coordinator Field Project Supervisor Port Graham Environmental Specialist Nanwwalek Environmental Specialist CRRC Nanwalek Community Facilitator CRRC Port Graham Community Facilitator Project Research Assistants		3.0 2.0 6.0 4.0 4.0 4.0 4.0 4.0 6.0	4.8 4.2 1.5 2.5 2.5 2.5 2.5 2.5 2.5 2.0		14.4 8.4 9.0 15.0 10.0 10.0 10.0 10.0 12.0 0.0 0.0					
	Subtota		39.0	25.0	0.0	0.0					
		Denergy second s		Per	sonnel Total	\$98.8					
Travel Costs:		Ticket	Round	Total	Daily	Proposed					
Description		Price	Trips	Days	Per Diem	FY 2001					
Two RT Fairbanks Field Office	e fice	0.5	4	8	0.1 0.1	2.8 1 4					
Four RT Anchorage EVOS	Office	0.3	4	4	0.1	1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0					
					Travel Total	\$5.8					
Contractual Costs:			· · · · · · · · · · · · · · · · · · ·			Proposed					
Description	- <u></u>					FY 2001					
Vessel Charter Communications, Publication Lab Sample Analysis	ons, Equipment Maintenance and Site Prep					10.0 12.0 15.0					
2 of 4						4/14/00					

1998 EXXON VALDEZ TRUS October 1, 1997 - September 30, 1998

	Contr	actual Total	\$37.0
Commodities Costs:			Proposed
Description			FY 2001
Glassware			0.2
			0.2
Field Supplies			0.6
	Commo	dities Total	\$1.0
		t	
New Equipment Purchases:	Number	Unit	Proposed
New Equipment Purchases: Description	Number of Units	Unit Price	Proposed FY 2001
New Equipment Purchases: Description Beach Fry Seine	Number of Units	Unit Price 1.0	Proposed FY 2001 1.0
New Equipment Purchases: Description Beach Fry Seine Surface Trawl	Number of Units 1 1	Unit Price 1.0 2.0	Proposed FY 2001 1.0 2.0
New Equipment Purchases: Description Beach Fry Seine Surface Trawl CTD	Number of Units 1 1 1	Unit Price 1.0 2.0 10.0	Proposed FY 2001 1.0 2.0 10.0
New Equipment Purchases: Description Beach Fry Seine Surface Trawl CTD Vertical Water Sampler	Number of Units 1 1 1 1	Unit Price 1.0 2.0 10.0 1.0	Proposed FY 2001 1.0 2.0 10.0 1.0
New Equipment Purchases: Description Beach Fry Seine Surface Trawl CTD Vertical Water Sampler Spectrophotometer	Number of Units 1 1 1 1 1 1	Unit Price 1.0 2.0 10.0 1.0 5.0	Proposed FY 2001 1.0 2.0 10.0 1.0 5.0
New Equipment Purchases: Description Beach Fry Seine Surface Trawl CTD Vertical Water Sampler Spectrophotometer	Number of Units 1 1 1 1 1	Unit Price 1.0 2.0 10.0 1.0 5.0	Proposed FY 2001 1.0 2.0 10.0 1.0 5.0 0.0
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New Equipment Purchases: Description Beach Fry Seine Surface Trawl CTD Vertical Water Sampler Spectrophotometer	Number of Units 1 1 1 1 1	Unit Price 1.0 2.0 10.0 1.0 5.0	Proposed FY 2001 1.0 2.0 10.0 1.0 5.0 0.0 0.0 0.0 0.0 0.0
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New Equipment Purchases: Description Beach Fry Seine Surface Trawl CTD Vertical Water Sampler Spectrophotometer	Number of Units 1 1 1 1	Unit Price 1.0 2.0 10.0 1.0 5.0	Proposed FY 2001 1.0 2.0 10.0 1.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0
New Equipment Purchases: Description Beach Fry Seine Surface Trawl CTD Vertical Water Sampler Spectrophotometer	Number of Units 1 1 1 1	Unit Price 1.0 2.0 10.0 1.0 5.0	Proposed FY 2001 1.0 2.0 10.0 1.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0
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 1998 EXXON VALDEZ TRUE
 COUNCIL PROJECT BUDGET

 October 1, 1997 - September 30, 1998

 Aluminum Work Skiff

 Plankton Nets and Associated Gear

 Coded Wire Tagging Equipment

 Field Lab set up

 Spectrophotometer

 Disecting Scope

 D.O. Meter

 Salinity Meter

 Live Tanks with regulated oxygen



PWSRCAC - EVOS Long Term Environmental Monitoring Program

Project Number:	01545					
Restoration Category:	Monitoring					
Proposer:	Prince William Sound Regional Citiz	zens' Advisory Council				
Lead Trustee Agency:	not applicable					
Cooperating Agencies:		RECEIVED				
Alaska SeaLife Center:	no	APR 1 4 2000				
Duration:	on going long term	EXXON VALDEZ OIL SPILL				
Cost FY 01:	\$218.1	TRUSTEE COUNCIL				
Cost FY 02:	\$224.6					
Geographic Area:	Prince William Sound, Kodiak, Kena	ni Peninsula, Alaska Peninsula				
Injured Resource/Service:						

ABSTRACT:

The Prince William Sound Regional Citizens' Advisory Council/Exxon Valdez Oil Spill Trustee Council Long Term Environmental Monitoring Program provides essential long term baseline measurements of hydrocarbon levels and sources at program sites within areas of the Prince William Sound, Kenai Peninsula, Kodiak, and Gulf of Alaska. The program objective is to provide a more comprehensive program for the collection of baseline data in subtidal sediments and mussel tissue that can be used to determine impacts of oil sources on the ecosystem. This program will provide an improved link to recovery status and greater efficiency in hydrocarbon sampling and analysis that has been on going since 1993 under the auspices of PWSRCAC.

INTRODUCTION:

The Prince William Sound Regional Citizens' Advisory Council (PWSRCAC) seeks partnership with the Exxon Valdez Oil Spill Trustee Council (EVOSTC) to carry out long term baseline measurements of hydrocarbon levels at program sites in the geographic area impacted by the T/V *Exxon Valdez* oil spill of 1989. Although PWSRCAC's Long Term Environmental Monitoring Program (LTEMP) has conducted hydrocarbon testing since 1993, the agency's purview is contained within the geographic area defined by oil tanker traffic lanes to and from the Alyeska Marine Terminal in the Prince William Sound.

The PWSRCAC/EVOSTC partnership will enable the expansion of the gathering of baseline data throughout the T/V *Exxon Valdez* oil spill impacted areas to testing sites in the Kenai Peninsula, the Alaska Peninsula, and Kodiak as well as the Prince William Sound. The scope of sampling will be enhanced to contribute a substantial amount of data to the baseline information that has been collected since 1993.

This program will aid researchers, subsistence communities, and trustees in the determinations of recovery status within the broader zone of the Prince William Sound, Kenai Peninsula, Kodiak and Alaska Peninsula.

The program will provide long term baseline measurements of hydrocarbon levels and sources in subtidal sediments and indigenous blue mussels. Subtidal sediment and intertidal indigenous (native) blue mussel tissue samples will be collected from fourteen stations for the analysis of polycyclic aromatic hydrocarbons (PAH), aliphatic hydrocarbons (AHC) which includes the unresolved complex mixture (UCM), total organic carbon (TOC), and particle grain size (PGS). Intertidal mussel samples will be collected for the analysis of PAH and lipid content with additional mussels collected for the measurement of gonadal index.

NEED FOR THE PROJECT:

A. Statement of Problem

Long term data sets having to do with hydrocarbon levels throughout the T/V *Exxon Valdez* oil spill impacted area are not available. The LTEMP data collection stemming from 1993 excludes much of the geographic scope of the T/V *Exxon Valdez* oil spill impacted coastline in the north Gulf of Alaska, including the oiled coastline along the Kenai and Alaska Peninsulas, Kodiak and Prince William Sound. PWSRCAC funding may only be applied to projects relating to the Alyeska Marine Terminal and associated tanker trade.

Long term environmental monitoring needs to be implemented in order to identify the physical and biological changes taking place in the north Gulf of Alaska ecosystem. It is essential to distinguish between natural trends and human caused changes in the environment. Establishing a baseline is needed in order to identify and assess trends over time.

The growth in commercial and recreational use of the north Gulf of Alaska creates further complexity in the problem of having adequate baseline data. These sensitive coastal marine environments are experiencing increased pressures on already intense use. This is evidenced by the growth in numbers of large and small passenger cruise ship traffic, the extension of the

Prepared 04/14/00

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longevity of the Trans Alaska Pipeline and its shipping activity, the new Whittier road access which is expected to create exponential growth in numbers of visitors, State oil and gas lease sales, new ports, increases in recreational uses, and demands for new access to fishing sites.

Baseline date is needed for the accurate assessment of recovery and to extend recovery determinations to the broader zone of the Prince William Sound, Kenai Peninsula, Kodiak and Alaska Peninsula.. Essential tools will be of use to researchers, subsistence communities and trustees. Measurements are needed having to do with the seasonal cycles of availability of hydrocarbons in zone affected by the T/V *Exxon Valdez* oil spill of 1989.

While the PWSRCAC investment in long term monitoring has been made independently since 1993, competing interests for funding have resulted in some decline in the LTEMP scope, in particular the exclusion of sediment sampling. While the monies to fund sediment sampling were cut, there is strong sentiment for the need for continuance of such. While the PWSRCAC funding source for LTEMP is Alyeska Pipeline Service Company, there may be project outcomes indicating sources of pollution other than that produced by Alyeska. Cooperative sources of project funding for hydrocarbon sampling and testing may be appropriate.

B. Rationale/Link to Restoration

A PWSRCAC/EVOSTC partnership will enable enhanced long term environmental monitoring in the T/V *Exxon Valdez* oil spill impacted areas in the north Gulf of Alaska along the Kenai and Alaska Peninsulas and Kodiak, as well as the Prince William Sound. The program will provide long term baseline measurements of hydrocarbon levels and sources in subtidal sediments and indigenous blue mussels.

Timely implementation of a program to extend of hydrocarbon testing to these areas will provide current and long term data sets that may prove extremely valuable in understanding ongoing natural and human caused changes. Results will allow researchers, subsistence users, and trustees to expand recovery determination to a greater portion of the zone impacted by the T/V *Exxon Valdez* oil spill.

Long term data sets can provide the baseline for the tracking of trends in the ecosystem and assistance in the identification of threats to important coastal resources. An early warning system can alert to the need for more specific research as changes occur such as leaps in hydrocarbon levels, as observed in Aialik Bay in 1998 (ref. LTEMP 1997-98 Annual Report). Environmental management can be enhanced with an improved information supply that is also independent of that provided by industry users. The program will provide tracking of lingering effects from the T/V *Exxon Valdez oil spill* of 1989.

The collection of long term baseline data is important because of the large variability inherent in studying natural populations. Because of the physical and biological variability in nature, a large amount of baseline data reflecting existing conditions is required before man-made changes to the environment can be identified or assessed. Collection of reliable data over time helps in the understanding of how natural and man made forces interact within a complex ecosystem.

The Long Term Environmental Monitoring Program can identify and track the multitude of origins of hydrocarbons in the marine environment. Hydrocarbons in the marine environment, particularly in the T/V *Exxon Valdez* oil spill area, can have a multitude of origins, including

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both natural and anthropogenic sources. These include the release of oil through man's activities such as the T/V *Exxon Valdez* oil spill in 1989, operations at the Alyeska Marine Terminal, or other oil transportation activities, combustion sources such as stack exhaust or forest fires, boating and ship activities, natural oil seepage, biological processes from bacteria or other organisms, and atmospheric fallout. Natural events such as earthquakes can also result in the release of hydrocarbons as can the seasonal change in physical water mass properties and environmental energy. All of these may contribute hydrocarbons to sediments and resident biota in Prince William Sound and the Gulf of Alaska

The PWSRCAC/EVOSTC partnership can leverage funding to implement essential long term environmental monitoring of the EVOS impacted coastal area. At this time the PWSRCAC board is prioritizing a wide area of responsibilities having to do with the environmentally safe transportation of oil. PWSRCAC and EVOSTC seem best suited to enter into such a funding partnership as long term funding commitments are possible, at least more so than with the annual governmental funding cycle. LTEMP data is of use and interest to many stakeholders outside the PWSRCAC. A participative investment in the program will help insure long term funding for long term monitoring. LTEMP has proven successful and cost effective. Testing standards are high and have been maintained consistently since 1993.

C. Location:

Established sites include:

Aialik Bay Alyeska Marine Terminal Disk Island Gold Creek Knowles Head Sheep Bay Shuyak Harbor Sleepy Bay Windy Bay, and Zaikof Bay *Four sites to be added may include: Kachemak Bay Kodiak Island, and Alaska Peninsula (Katmai National Park) Kenai Fjiods National Park

*NOTE: THE EXACT LOCATIONS OF THE NEW TESTING SITES WILL BE DETERMINED AFTER RECONNAISSANCE OF THE AREAS AND STUDY AND COORDINATION BETWEEN PWSRCAC AND EVOSTC .

See Figure 1.

COMMUNITY INVOLVEMENT AND TRADITIONAL KNOWLEDGE:

PWSRCAC operates a standard practice making annual presentations and mailing a quarterly PWSRCAC Newsletter to most post office boxes in the affected communities. Presentations and articles are offered in lay terms and technical information is offered upon request. PWSRCAC



managers make a practice of going out into the communities to dispense project information, including LTEMP, to the general population.

In order to encourage greater community participation, technicians from local communities will be recruited and hired to accompany scientists during the collection of samples. The openings will be rotated between communities to broaden the reach of participation and understanding about the long term monitoring project.

PWSRCAC works closely with other federal, state, Native, and local government agencies, conservation organizations, businesses, and private landowners. Community involvement is inherent in PWSRCAC's nineteen member Board of Directors, and committee memberships, which includes the following community representatives:

Executive Committee:

William M. Walker, President	Valdez
Margy Johnson, Vice President	Cordova
Marilynn Heddell, Secretary	Whittier
JoAnn McDowell, Ph.D., Treasurer	Valdez
Blake Johnson, Member at Large	Kenai
Stan Stephens	AK Wilderness Recreation & Tourism Ass.
Dennis Lodge, Member at Large	Seward
Other Directors:	
John Allen	Tatitlek Corp., Tatitlek Village IRA Council
Patience Andersen-Faulkner	Cordova District Fishermen United
Jim Nestic	Kodiak Village Mayors Assoc.
Wayne Coleman	Kodiak
Tom Jensen	Alaska State Chamber of Commerce
Stephen Lewis	Seldovia
Bill Lindow	Prince William Sound Aquaculture Corp.
Paul McCollum	Homer
Tom Copeland, Member at Large	Oil Spill Region Environmental Coalition
Darrell Totemoff	Chenega Bay Corp., Chenega IRA Council
Thomas Walters	Kodiak
Sheri Buretta	Chugach Alaska Corporation

Scientific Advisory Committee (This committee oversees LTEMP):									
Richard Tremaine, Chair	Anchorage								
Dr. Peter Armato,	Seward								
Gig Currier,	King Salmon								
Bill D'Atri,	Anchorage								
Gary Lawley, Ph.D.	Anchorage								
Michelle Hahn O'Leary,	Cordova								
AJ Paul, Ph.D.	Seward								
James D. Steward,	Anchorage								
Loren Tuttle,	Cordova								
Charles K. Weaverling,	Cordova								
John Williams,	Cordova								

PROJECT DESIGN:

A. Objectives:

The purpose of the Long Term Environmental Monitoring Program is to provide long term baseline measurements of hydrocarbon levels and sources in subtidal sediments and indigenous blue mussels at program sites within areas of Prince William Sound, Kenai Peninsula, Kodiak, and the Gulf of Alaska, an area represented by the EVOSTC and in part by PWSRCAC. The objectives of the program are to fully document the field and laboratory data collected and to maintain data integrity. This expanded data collection will expand monitoring efficiency and may then be used in determinations by researchers, subsistance users, and trustees by providing a link to the recovery status of species of concern.

B. Methods

The basic sampling approach for this program is consistent with the National Oceanographic and Atmospheric Administration's (NOAA) National Mussel Watch Project where native populations of sedentary organisms are utilized as bioindicators of chemical contamination, and nearby sediments are used to evaluate trends in contamination in the marine environment (NOAA, 1989a).

Bivalves such as the blue mussel filter large volumes of water, and numerous studies have indicated that they can accumulate hydrocarbons to a level several orders of magnitude above the water column concentrations (National Research Council, 1985). Long term studies of mussel tissue at selected sites can provide information concerning the trends of hydrocarbon contamination at those sites. Bioaccumulation of hydrocarbons in mussels is a dynamic process as mussels eliminate the contaminants from their body tissues both in response to cleaner conditions and through the release of gametes during spawning. For this reason, repeated sampling is helpful in determining trends in contamination, as each sampling event provides information on contamination levels that exist at that point in time

Sediment analyses are intended to provide information concerning the potential accumulation of hydrocarbons in the subtidal environment. Sediment transport from beaches potentially contaminated with petroleum or deposition of hydrocarbons adsorbed on particulate matter are the primary processes contributing to hydrocarbon concentrations in subtidal sediments. For this program, recently-deposited sediments (top 2 centimeters [cm]) are examined to determine hydrocarbon content.

Analytical approach includes the use of compound-specific measurements for organic parameters such as PAH and AHC (including UCM). These parameters are used to assess hydrocarbon concentrations in both tissue (PAH and AHC) and sediment (PAH and AHC). Additional parameters analyzed for tissues included percent lipids and gonadal index. These measurements are important because the gonads in these organisms are largely composed of lipid material which is the primary storage vehicle for hydrocarbons (National Research Council, 1985). When the lipid-rich gametes are released during spawning, hydrocarbons are also discharged. Measurement of the gonadal state and percent lipids is therefore necessary to provide information concerning apparent differences in tissue concentrations which may be an artifact of spawning condition at the time of mussel collection rather than real temporal differences. Mussels in temperate areas generally spawn in the cooler months. Primary spawning (and release

of lipid-rich gametes that may contain accumulated hydrocarbons) occurs from mid-April to early June. Sampling in late spring (March) allows collection of mussels in varying stages of gametogenesis, but prior to major spawning activity. Sample collection in the summer occurs in the late- or post-spawning period when mussel gonads are returning to a resting state.

Analytical strategy is summarized in Table 1.

Analytical methods include tissue sample collection in the intertidal area which is analyzed for PAH, AHC, and lipid content. Mussel samples designated for hydrocarbon analysis are collected by hand from the mid-intertidal zone of each station using a stratified random sampling design. Three replicates of 30 individuals each are collected from three randomly-selected points along a 30-m transect. Replicate mussel samples are analyzed for PAH, AHC, and percent lipids.

In addition to the tissue samples designated for chemical analysis, twenty additional mussels are collected at each station for assessment of gonadal state. Samples for gonadal index determination are also collected. A single composite sample of 20 individual mussels are collected at each intertidal station (approximately 7 individual mussels from each replicate area). These mussels are bagged and returned to the survey vessel without freezing. These live mussel samples are chilled in the refrigerator or a cooler with ice packs until processing.

Subtidal sediment samples are analyzed for the following parameters: PAH, AHC, PGS, and TOC. A modified Van Veen grab was used to collect each replicate. Shallow subtidal sediment is collected using divers at a limited number of sites. Field and equipment rinsate blanks are analyzed for PAH and AHC.

With the exception of gonadal index which is determined in the field or at KLI Anchorage, all samples are analyzed at GERG.

Navigation and station location include the use of nautical and topographic charts, radar, and a global positioning system (GPS). A locally chartered vessel is used for all field surveys. In addition, during March surveys, Gulf of Alaska stations are sampled from a chartered float plane out of Anchorage. Beach sampling is accomplished using a Zodiac[®] outfitted with an outboard motor.

The project includes a comprehensive quality assurance, quality control (QA/QC) program that encompasses all aspects of the project, from initial sample collection through laboratory analysis and data analysis to reporting.

The early stages of the LTEMP program included an investigation of the statistical power of the study design which indicated that the triple replication in the existing study design was sufficient to address program objectives (KLI, 1993a).

Table 1.	LTEMP Analytical Strategy.	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
Parameter	Description	Matrix	Relevance
Polycyclic aromatic hydrocarbons (PAH)	2 to 6-ring polycyclic aromatic hydrocarbon compounds; includes homologous series of aromatic hydrocarbons consisting of unsubstituted (parent) compounds, such as naphthalene, and substituted compounds, which are similar structures with alkyl side chains that replace hydrogen ions, such as C ₁ -naphthalene	Mussel tissue, sediment, and water (blanks)	Useful for determining hydrocarbon contamination and the relative contribution of petrogenic, pyrogenic, and diagenic sources; useful in source identification and determination of weathering rates
Aliphatic hydrocarbons (AHC)	Fully saturated normal alkanes (paraffins) and branched alkanes, $n-C_{10}$ to $n-C_{34}$; includes the isoprenoid compounds pristane (C ₁₉) and phytane (C ₂₀) that are often the most abundant isoprenoids in petroleum hydrocarbons	Mussel tissue, Sediment and water (blanks)	Useful for determining hydrocarbon contamination and the relative contribution of petrogenic and biogenic sources; useful in determination of weathering rates and rates of oil degradation
Unresolved complex mixture (UCM)	A mixture of hydrocarbons of undefined structure that are not separated by gas chromatographic techniques; represented by the total resolved plus unresolved area minus the total area of all peaks that have been integrated; a characteristic of some fresh oils and most weathered oils	Mussel tissue, sediment and water (blanks)	Useful for determining hydrocarbon contamination and the relative contribution of petrogenic, pyrogenic, and diagenic sources; useful in source identification and determination of weathering rates
Percent Lipid	Lipid material in mussel tissue is primary storage area for hydrocarbons; gametes are mostly comprised of lipids	Mussel tissue	Useful in determining spawning state of mussels; hydrocarbon body burdens decrease when lipid-rich gametes are released during spawning
Gonadal Index	Measure of shell length, shell volume, volume and weight of gonadal tissue, volume and weight of non-gonadal tissue	Mussel tissue and shell	Useful in determining spawning state of mussels; hydrocarbon body burdens decrease when lipid-rich gametes are released during spawning
Particle Grain Size (PGS)	Percent sand, silt, and clay	Sediment	Assessment of particle size distribution in sediments; potentially used to standardize organic parameters such as PAH and AHC
Total Organic Carbon (TOC)	Organic carbon	Sediment	Assessment of organic carbon load in sediment; potentially used to standardize organic parameters (PAH and AHC)
Total Resolved Aliphatic Hydrocarbon (TRAHC)	A mixture of hydrocarbons defined and undefined by gas chromatographic techniques that represents the total resolved and unresolved area of the GC run. Includes the AHC analyte list, UCM, and other compounds (e.g., plant waxes and lipids)	Mussel tissue	Provides additional information concerning biogenic (biologically sourced) component of the hydrocarbons that may be present in the mussel tissue

Additional parameters examined in sediments include PGS and TOC, which are typically analyzed to evaluate their correlation with the hydrocarbon parameters. It has been shown that these conventional variables, particularly grain size, may show correlation with hydrocarbon parameters (Thompson and Eglinton, 1978) and must be evaluated as concomitant variables during statistical analysis of the organic data.

C. Cooperating Agencies, Contracts, and Other Agency Assistance:

Prince William Sound Regional Citizens' Advisory Council cooperates with several agencies and groups throughout the region and state. Participation from Native Alaskan communities in particular is encouraged in order to garner local knowledge and gain feedback regarding the PWSRCAC's work.

PWSRCAC has contracted for sampling, laboratory work and reporting to Kinnetic Laboratories, Inc. (KLI) with an office in Anchorage, Alaska. Project personnel are Alaska based. Laboratory analysis is performed at GERG, Geochemical and Environmental Research Group at Texas A&M University. KLI has won each public bid since the program was initiated in 1993. Currently KLI is under a three year contract with PWSRCAC ending June 30, 2002. KLI's work has proven satisfactory to the PWSRCAC board, management and Scientific Advisory Committee. An independent scientific peer review of the contractor's draft product is performed periodically. An in depth data analysis was performed in 1998 (J>R> Payne Environmental, 1998). Resumes of key personnel at Kinnetic Laboratories are attached (Attachment A).

The National Oceanic and Atmospheric Administration (NOAA)'s Mussel Watch Project samples five sites in Alaska, two of which are in the Prince William Sound at Siwash Bay and Mineral Creek. Sampling frequency is once every two years. NOAA and PWSRCAC coordinate with shared samples. In the spring 2000 testing NOAA will share samples for background testing.

SCHEDULE:

A. Measurable Project Tasks for FY 01 (October 1, 2000 – September 30, 2001):

October, 2000 March, 2001 April, 2001 April-May, 2001 April-May, 2001 May, 2001 April-September, 2001 July, 2001 July, 2001 July-August, 2001 July-September, 2001 September, 2001 August-September, 2001 Notice to Proceed Field Sampling Field Survey Report Laboratory Analysis Laboratory QA/QC Laboratory Reporting Data Validation and Management Field Sampling Field Survey Report Laboratory Analysis Laboratory QA/QC Laboratory Reporting Data Analysis

See Figure 2.

PROJECT TIMELINE

PRINCE WILLIAM SOUND REGIONAL CITIZENS ADVISORY COUNCIL

PWS RCAC/EVOS LONG TERM ENVIRONMENTAL MONITORING PROGRAM, 2000-2001

	2000			 2001										
TASK	ОСТ	NOV	DEC	JAN	FEB	MAR		APR	MAY		JUN	JUL	AUG	SEP
NOTICE TO PROCEED	•			 										
FIELD SAMPLING				 			 					├ ──┤		
FIELD SURVEY REPORT							•	•				•		
LABORATORY ANALYSIS				 			\vdash					\vdash		
LABORATORY QA.QC				 			\vdash							
LABORATORY REPORTING				 						♦				•
DATA VALIDATION & MGT.														•
DATA ANALYSIS				 										
MONTHLY STATUS REPORT				 		•		•	•		•	•	•	•
DRAFT ANNUAL REPORT			. 										ا	ctober 31
PEER REVIEW/SAC MTING				 									Nov	vember 15
FINAL ANNUAL REPORT				 									Dec	cember 15

PUBLICATIONS AND REPORTS:

- 1. March-September, 2001 Monthly Status Report
- 2. October 31, 2001 Draft Annual Report
- 3. November 15, 2001 Peer Review/Scientific Advisory Committee Meeting
- 4. December 15, 2001 Final Annual Report

See Figure 2.

PROFESSIONAL CONFERENCES:

No travel funds for professional conferences are being requested. PWSRCAC is prepared to pay conference costs associated with presenting LTEMP. PWSRCAC managers frequently deliver papers at professional conferences and are willing to present project results when applicable

NORMAL AGENCY MANAGEMENT:

Proposer is not a government agency.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT:

LTEMP data is provided to Native Alaskan corporations and representatives on an annual basis. The data is shared specifically with NOAA where particular coordination efforts take place. All reports and data will be available on the PWSRCAC web site <u>www.pwsrcac.org</u>.

On a two year cycle, letters are written to agencies and private companies performing similar work in the Prince William Sound, north Gulf of Alaska area to provide an update regarding LTEMP, make certain project results are being disseminated, and to insure no duplication of effort is taking place. Copies of several written responses are attached *(Attachment A)*.

PRINCIPAL INVESTIGATOR:

Name: John S. Devens, Ph.D. Affiliation: Executive Director, Prince William Sound Regional Citizens' Advisory Council Mailing address: P.O. Box 3089, Valdez, AK 99686 Phone number: (907) 835-5957 Fax number: (907) 835-5926 E-mail address: rcac@valdez.pwsrcac.org

See resume Attachment B

PWSRCAC is an independent non-profit organization formed after the T/V *Exxon Valdez* oil spill of 1989 to promote environmentally safe operation of the crude oil terminal in Valdez and the tankers it serves. Under a contract with Alyeska Pipeline Service Company, PWSRCAC monitors and advises Alyeska on terminal operations, spill prevention, response planning, and other environmental issues. The federal Oil Pollution Act of 1990 requires an industry funded citizens' advisory group for Prince William Sound. Our 19 member board includes communities affected by the Exxon Valdez oil spill and interest groups with a stake in the affected region.

The Scientific Advisory Committee sponsors PWSRCAC LTEMP. The committee oversees and performs periodic peer reviews of the work.

OTHER KEY PERSONNEL:

See resumes of Kinnetic Laboratories personnel (Attachment C).

PWSRCAC Council Staff and Offices: Deputy Director: Marilyn Leland Public Information Manager: Stan Jones Community Liaison: Leann Ferry Financial Operations Manager: Linda Robinson Information Systems Manager: Daphne Jenkins Administrative Assistant: Andrea Archer Project Managers: Joe Banta, Lisa Ka'aihue, Becky Lewis Anchorage address and numbers: Prince William Sound Regional Citizens' Advisory Council 3709 Spenard Road Anchorage AK 99503 USA 907-277-7222 Fax: 907-277-4523 Toll-free: 800-478-7221

Deputy Director: Lynda Hyce Executive Assistant: Donna Walsh Administrative Assistant: Jennifer Quinlan Project Managers: Joe Bridgman, Rica Salvador Valdez address and numbers: Prince William Sound Regional Citizens' Advisory Council P.O. Box 3089 Valdez AK 99686 USA 907-835-5957 Fax: 907-835-5926 Toll-free: 877-478-7221

Internet:

Worldwide Web: http://www.pwsrcac.org Anchorage email: rcac@anch.pwsrcac.org Valdez email: rcac@valdez.pwsrcac.org

LITERATURE CITED:

1993 LTEMP Annual Monitoring Report & Appendices
1994 LTEMP Annual Monitoring Report & Appendices
1995 LTEMP Annual Monitoring Report & Appendices
1996-97 LTEMP Annual Monitoring Report & Appendices
1997-98 LTEMP Annual Monitoring Report & Appendices
1998-1999 LTEMP Final Report
Long Term Data Analysis of Hydrocarbons in Intertidal Mussel and Marine Sediments, 1993-1996, J.R. Payne Environmental

All reports indicated above available upon request.

Budget Category: FY 20 Personnel	000 FY 2001 \$160.1 \$35.2 \$9.8 \$83.4 \$288.5 \$23.1 \$218.1	LONG RANGE FUNDING REQUIREMENTS
Personnel Travel Contractual Commodities Equipment Subtotal Indirect EVOSTC Total PWS RCAC Total* Project Total Full-time Equivalents (FTE) Other Resources: Comments:	\$160.1 \$35.2 \$9.8 \$83.4 \$288.5 \$23.1 \$218.1	LONG RANGE FUNDING REQUIREMENTS
Personnel Travel Contractual Commodities Equipment Subtotal Indirect EVOSTC Total PWS RCAC Total* Project Total Full-time Equivalents (FTE) Other Resources: Comments:	\$160.1 \$35.2 \$9.8 \$83.4 \$288.5 \$23.1 \$218.1	LONG RANGE FUNDING REQUIREMENTS
Travel Contractual Commodities Equipment Subtotal Indirect EVOSTC Total PWS RCAC Total* Project Total Full-time Equivalents (FTE) Other Resources: Comments:	\$35.2 \$9.8 \$83.4 \$288.5 \$23.1 \$218 1	LONG RANGE FUNDING REQUIREMENTS
Contractual	\$9.8 \$83.4 \$288.5 \$23.1 \$218.1	LONG RANGE FUNDING REQUIREMENTS
Commodities Equipment Subtotal Indirect EVOSTC Total PWS RCAC Total* Project Total Full-time Equivalents (FTE) Other Resources: Comments:	\$83.4 \$288.5 \$23.1 \$218.1	LONG RANGE FUNDING REQUIREMENTS
Equipment Subtotal Indirect EVOSTC Total PWS RCAC Total* Project Total Full-time Equivalents (FTE) Other Resources: Comments:	\$288.5 \$23.1 \$218.1	LONG RANGE FUNDING REQUIREMENTS
Subtotal Indirect EVOSTC Total PWS RCAC Total* Project Total Full-time Equivalents (FTE) Other Resources: Comments:	\$288.5 \$23.1 \$218.1	
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EVOSTC Total PWS RCAC Total* Project Total Full-time Equivalents (FTE) Other Resources: Comments: *DOAD will provide OCC/ of the project if for the project if for the project if for the project if the project if for the project if for the project if for the project if the project if for the project if for the project if for the project if for the project if the project if for the project if the project if for the project if the	\$218.1	FY 2002**
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Project Total Full-time Equivalents (FTE) Other Resources: Comments:	\$93.5	
Full-time Equivalents (FTE) Other Resources: Comments: *DOAQ will provide OCC/ of the provide CCC/	\$311.6	
Other Resources: Comments:	1.0	
Comments:		
In-kind funding provided by PWSRCAC inclu of approximately 200 hours, and miscellaned greater than \$30,000.00.	udes manager time o ous office expenses f	f approximately 300 hours, Scientific Advisory Committee volunteer time or faxing, copying, telephone calls and such. These in-kind expenses are estimated at
FY01 Project Project Name:	FORM 4A /EVOSTC Long-Term Environmental Monitoring	
	Lisa Ka'aihue	
	Lisa Ka'aihue	

2001 EXXON VALDEZ TRUST October 1, 2000 - September 30, 2001

3

Pers	sonnel Costs:		-				Months	Monthly		Proposed
	Name		Position Descr	ption			Budgeted	Costs	Overtime	FY 2001
	Kinnetic Labor	ratories	Scientist V				0.4	19,281		7,795
	Pasa		Scientist IV				6.3	16,960		107,431
			Computer Ana	lyst IV			0.1	18,210		1,227
			Scientist III				0.2	12,854		2,598
			Computer Ana	lyst III			0.5	12,140		6,544
			Scientist III				2.3	9,997		23,579
			Scientist I				0.3	7,319		2,466
			Editor/Drafting				0.3	7,855		2,646
	Community Hi	res	Technician /Tra	ainees			1.5	4,333		6,500
		······								
					Subtotal		11.9	108,949		
								Pe	ersonnel Total	\$160,786
Trav	el Costs:		1			Ticket	Round	Total	Daily	Proposed
	Description					Price	Trips	Days	Per Diem	FY 2001
	Airfare R/T (Al	NC-VDZ)		· · · ·	-	170.00	4			680
	Per diem/room	and board						36	125	4,500
	Truck rental/da	ay						12	50	600
	Mileage charg	e/mile						1800	0.25	450
	Sampling vess	sel PWS w/crew	per day					16	950	15,200
	Sampling vess	sel GOA w/crew	per day						1200	9,600
	Float plane - C	esna 206/hr						14	300	4,200
	····								Turnel Tabal	05.000
										35,230
					· · · · · · · · · · · · · · · · · · ·			<u> </u>		
				1					F	ORM 4B
	FY01		Project Num	iber:					F	Personnel
			Project Litle	: PWSRCAC	EVOSIC LO	ong-Term En	vironmental l	Monitoring		& Travel
			Name: Lisa	Ka'aihue						DETAIL
Prep	ared: 4/13/00									
		<u> </u>								

2001 EXXON VALDEZ TRUST October 1, 2000 - September 30, 2001

Contractual Costs:									Proposed	
Des	cription							Unit	Rate	FY 2001
	KLI Zodiac Ma	ark III/day						23	75	1,725
	SCUBA Gear	(2)/ day						21	200	4,200
	Poseidon com	pressor/day						21	50	1,050
	Benthic grab/c	Jay						17	25	425
	Field computer/day							23	15	345
	Navigation/Survey Eqpt./day							23	25	575
	Fed-X sample shipping/cooler							9	75	675
	Freight costs							620	1	620
	Communication							150	1	150
	Contractu						ntractual Total	9,765		
Con	modities Cos	ts:								Proposed
Des	cription							Unit	Rate	FY 2001
	Photocopies/p	age						15000	0.05	750
	Facsimile/page							150	0.50	75
	Shackles/Line	/Hardware						150	1	150
	Chemistry san	nple containers	250 ml/case					12	40	480
	Chemistry san	nple containers	1000 ml/case					1	50	50
	Acetone/case	4 X 4L						1	145	145
	Hexane/case	4 X 4L						1	150	150
	HPLC Water/c	ase 4 X 4L						1	100	100
	Lab supplies (gloves, pipettes	, etc.)					150	1	150
	Tissue PAH/A	HC analysis/sar	nple					84	450	37,800
	Sediment PAF	& AHC analysi	is/sample					100	375	37,500
	Sediment Particle Size & TOC analysis /sample					100	60	6,000		
					<u> </u>			Comn	nodities Total	83,350
						l				
							F	OBM 4B		
			Project Number:						ntractual &	
FY01			Project Title: PWSRCAC/EVOSTC Long-Term Environmental Monitoring						mmodition	
			Name: Lisa Ka'aihue							
Prec	ared: 4/13/00		TL	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		·		

October 1, 2000 - September 30, 2001

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Prepared: 4/13/00

New Equipment Purchases: Number Unit Proposed Description of Units Price FY 2001 Those purchases associated with replacement equipment should be indicated by placement of an R. New Equipment Total Existing Equipment Usage: Number Description of Units FORM 4B Project Number: Equipment **FY01** Project Title: PWSRCAC/EVOSTC Long-Term Environmental Monitoring DETAIL Name: Lisa Ka'aihue

0.0

\$0.0

Attachment A Letters



United States Department of the Interior

MINERALS MANAGEMENT SERVICE Alaska Outer Continental Shelf Region 949 East 36th Avenue, Suite 308 Anchorage, Alaska 99508-4363

JAN | | 1999

Ms. Lisa Ka'aihue Project Manager Regional Citizens' Advisory Council 750 W. 2nd Avenue, Suite 100 Anchorage, Alaska 99501-2168



Dear Ms. Ka'aihue:

This letter is in response to your letter of December 31, 1998, to Dr. Richard Prentki soliciting coordination between the Prince William Sound Citizens' Advisory Council's Long-Term Environmental Monitoring Project and environmental monitoring work being done by Minerals Management Service (MMS).

We appreciate being kept informed of your environmental monitoring program and have found your studies useful and of high quality. The MMS does not have any additional contaminant field work scheduled for the Cook Inlet/Shelikof Strait Planning Area at this time. Field sampling for the Shelikof Strait Sediment Quality Study has been completed, with the Final Report due in January, 2000. The MMS will hold another workshop on that study in 1999, when the contractor is ready to report results. Dr. Richard Prentki (907-271-6599) of my staff will provide you with dates, agenda, and reports as they become available.

Because of the relative magnitudes of offshore oil industry activity, the MMS is currently primarily interested in the Beaufort Sea Planning Area, with the Cook Inlet/Shelikof Strait Planning Area being of secondary interest. I am enclosing a copy of the FY 2000-2001 Alaska Annual Studies Plan for your information, which will provide you with a summary of our current and proposed studies. The Annual Studies Plan is developed from external and within-agency needs assessment, with the individual study descriptions then prioritized by MMS. Generally, only a portion of proposed studies are funded in a given year. Thank you for contacting us.

Sincerely,

Unclonter

Cleveland J. Cowles, Ph.D. Chief, Environmental Studies Section

Enclosure

Exxon Valdez Oil Spill Trustee Council

645 G Street, Suite 401, Anchorage, AK 99501-3451

907/278-8012 fax: 907/276-7178



November 26, 1997

Lisa Ka'aihue Regional Citizens' Advisory Council 750 W. 2nd Avenue, Suite 100 Anchorage, Alaska 99501



Dear Lisa:

This letter concerns the RCAC staff recommendation to negotiate a contract for the LTEMP Data Analysis project (611), which I understand will be considered by the Board at its December 4 meeting. Although I am not in a position to comment on any competing uses for RCAC funds, I encourage the Board to authorize a contract to carry out the data analysis project. Here are my reasons:

The larger LTEMP project (608) is of fundamental importance to the RCAC mission, and you now have four years' data available for analysis. There sometimes is a tendency for institutions to sponsor the gathering of large volumes of data without a clear vision of how the data will be used, nor adequate provision for analysis. Arranging now for a comprehensive, statistically rigorous review of the LTEMP data is both appropriate and timely. The results, of course, bear directly on the RCAC mission to monitor the environmental impact associated with the terminal facilities and tanker traffic. Moreover, a thorough analysis also will enable the RCAC to better evaluate the scientific worth and cost-effectiveness of the LTEMP data and provide a solid basis for extending or modifying the program over the longer term.

Good, long-term data sets on environmental parameters are rare and extremely valuable, as we learned all to well in the aftermath of the *Exxon Valdez* oil spill. As the RCAC looks to the scope and design of the LTEMP program in the future (FY 1999 and beyond), the most important thing you can do now is to obtain a thorough analysis of the existing data. Since you lack a statistician or hydrocarbon chemist among your scientific advisors, an outside expert is necessary, as you have proposed. I also note that you plan to obtain independent scientific peer review of the contractor's draft product, and this is essential.

Again, I understand the need for project 611 and encourage the RCAC Board to proceed. Please let me know if I can supply any information relative to the *Exxon Valdez* restoration program.

Sincerely,

Sta

Stanley E. Senner Science Coordinator

Molly McCammon CC: **Executive Director**

SS/ty

Gunnar G Lauenstein, 1/12/99 1:08 PM -0500, Alaska Mussel Watch Project samp

X-From_: Gunnar.Lauenstein@noaa.gov Tue Jan 12 09:06:57 1999 Date: Tue, 12 Jan 99 13:08:22 EST X-Priority: 3 (Normal) To: <sac@alaska.net> From: Gunnar G Lauenstein <Gunnar.Lauenstein@noaa.gov> Reply-To: <Gunnar=Lauenstein%CMBAD%NORCA@mhc.rdc.noaa.gov> Subject: Alaska Mussel Watch Project sampling X-Incognito-SN: 1047 X-Incognito-Version: 4.11.23 MIME-Version: 1.0

Re: Your December 31, 1998 letter

Dear Ms. Ka'aihue:

Our Mussel Watch Project initially established two sites in Alaska, both in Prince William Sound. Those are the sites at Siwash Bay and Mineral Creek with sampling occurring on annual basis. Sampling frequency was reduced to once every two years after 1993. In 1995 we also analyzed samples from some of your sites. All NOAA Mussel Watch Project samples are analyzed for selected PCB congeners, PAHs, chlorinated pesticides and trace elements. The standard list of analytes has been expanded on occasion. Analytes determined in samples are documented in NOAA Technical Memorandum NOS ORCA 130. Also in 1995 three additional sites were added to the list of sites that are part of the core sampling effort: Homer Spit,Mountain Point, and East Side. Our core Alaska samples will be sampled during the 1999 field season and the projection is that these sites will be sampled again in the year 2001.

Detailed site information is available in NOAA Technical Memorandum NOS ORCA 112. This technical memorandum and the methods memorandum are available from this office.

Data resulting from this work are available at our internet site: <u>http://www-orca.nos.noaa.gov/projects/nsandt/nsandt.html</u>.

Site summary information is provided below.

If you would like technical memoranda or more information about our project please let me know.

Sincerely,

Gunnar G. Lauenstein

Mussel Watch Project Sites

Site Site Site Latitude Longitude code name location (N) (W)

KTMP Ketchikan Mountain Point 55° 17.63' 131° 32.88
NBES Nahku Bay East Side 59° 27.20' 135° 20.19'
PWSH Prince William Sound Sheep Bay 60° 38.44' 145° 59.40'
PWKH Prince William Sound Knowles Head 60° 41.28' 146° 35.01'
PVMC Port Valdez Mineral Creek Flats 61° 07.97' 146° 27.66'
UISB Unakwit Inlet Siwash Bay 60° 57.65' 147° 38.76'
PWDI Prince William Sound Disk Island 60° 29.58' 147° 39.35'

Printed for Lisa Ka'aihue <sac@alaska.net>

I

Gunnar G Lauenstein, 1/12/99 1:08 PM -0500, Alaska Mussel Watch Project samp

GASL Prince William Sound Sleepy Bay 60° 04.04' 147° 49.53' GAWB Gulf of Alaska Windy Bay 59° 13.12' 151° 31.02' CIHS Cook Inlet Homer Spit 59° 36.87' 151° 26.65' GASH Gulf of Alaska Shuyak Harbor 58° 30.06' 152° 37.31'

Mussel Sample Collection Years

Site Main Location Specific Location State 93 94 95 96 97 99 01

KTMP Ketchikan Mountain Point AK х ххх NBES Nahku Bay East Side AK х ххх PWSH Prince William Snd. Sheep Bay AK х PWKH Prince William Snd. Knowles Head AK х PVMC Port Valdez Mineral Creek AK x x x x x UISB Unakwit Inlet Siwash Bay AK x x x x x PWDI Prince William Snd. Disk Island AK \mathbf{x} GASL Gulf of Alaska Sleepy Bay AK x GAWB Gulf of Alaska Windy Bay AK х CIHS Cook Inlet Homer Spit AK x x x x GASH Gulf of Alaska Shuyak Harbor AK х



United States Department of the Interior

MINERALS MANAGEMENT SERVICE Alaska Outer Continental Shelf Region 949 East 36th Avenue, Suite 308 ANCHORAGE, ALASKA 99508-4363

Seventeenth Coast Guard District (mor) (Docket CGD17-99-13) P.O. Box 25517 Juneau AK 99802

JAN 1 2 2000

Dear Sir:

This letter is in support of recertification of the Prince William Sound Regional Citizens' Advisory Council (PWSRCAC) as the voluntary advisory group for Prince William Sound, Alaska, under the Oil Terminal and Oil Tanker Environmental Oversight and Monitoring Act of 1990.

The Alaska Outer Continental Shelf Region of the Minerals Management Service (MMS) has worked cooperatively in the last several years, sharing data and reports, and MMS staff have given presentations to PWSRCAC. The MMS, other government agencies, and the public have benefited from PWSRCAC-sponsored or supported workshops.

I would like to commend the PWSRCAC's emphasis on science and dedication in performing their functions under the 1990 Act. In particular, I appreciate the high quality of the science in their environmental monitoring such as the LTEMP monitoring program. Because of the cooperative relationship offered by the PWSRCAC, I have been able to integrate PWSRCAC monitoring results and some of PWSRCAC concerns in designing Minerals Management Service environmental studies related to oil and gas activities in the Gulf of Alaska. This integration has made for both better and more cost-effective science.

Overall, the public and MMS have benefited from the work of PWSRCAC and I recommend recertification of the PWSRCAC as the voluntary group for Prince William Sound.

Sincerely,

Rue 7 Fret

Richard T. Prentki, Ph.D. Oceanographer & COTR

cc: John Devens, Executive Director

Attachment B Resume John Devens, Ph. D. Principal Investigator

14

T-758 P.01/10 F-286

0: LISA 10 PAGES

John S. Devens PO Box 770 Valdez, Alaska 99686 (907) 835-3340

Highlights

In 1978 I founded Prince William Sound Community College and served as president until March 1992, at which time I resigned to run for the United States House of Representatives. Although I was not successful in my bid for Congress, I did come within 3% of defeating a twenty year incumbent. In August of 1993, I became President of Sterling College, a small, private, Vermont college specializing in environmental studies and resource management. I served as President of Sterling College until 1996 at which time I refused a second three-year contract. In 1997 I accepted the position of

Executive Director of the Prince William Sound Regional Citizens' Advisory Council.

During the first three years as President of Sterling College I concentrated on increasing the number and amount of private gifts, diversifying offerings, and on increasing enrollment. During that period of time, Sterling received the largest single gift in its history which more than doubled the income from annual giving, began an off campus program of study in the Western United States, and increased enrollment by 22%.

As President of Prince William Sound Community College my greatest accomplishments were in the areas of fund raising at both the state and local levels, encouraging support from both political and industrial areas, long range planning, and in program development. PWSCC received accreditation while I was president.

My experience includes giving many speeches to national and international audiences and authoring numerous professional articles, papers and media presentations. I have held academic rank at five colleges and universities, hold the Certificate of Clinical Competence in both Audiology and Speech- Language Pathology, was president of two colleges, served as Mayor of Valdez. Alaska during the Exxon oil spill, led five trade missions to Asia, administered budgets, developed long range plans and have had more than twenty years of administrative experience.

Education

Wichita State University Ph.D. in Communication Science

Emory University M.Ed. in Audiology and Speech Pathology

Belmont College B.S. in Elementary Education Wichita, Kansas 1975

Atlanta, Georgia 1966

Nashville, Tennessee 1964

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Experience

Regional Citizens' Advisory Council Executive Director

Anchorage, Alaska 1997 to present

 The Regional Citizens' Advisory Council receives its authority from the Oil Pollution Act of 1990 and is funded through a contract with the Alyeska Pipeline Service Company. The annual budget of slightly more than \$3,000,000 funds a number of studies and research projects designed to provide information regarding the safe transportation of petroleum products in Alaskan waters. There is a staff of 16 people tocated in two offices. The Executive Director reports to a 19 person Board of Directors.

Cross Country Healthcare Clinical Consultant

Boca Raton, Florida 33432 1996 to 1997

 I provided clinical speech pathology and audiology services in hospital and skilled nursing homes. The assignment includes working with Radiology Departments in providing video florographic studies.

Sterling College

President

Craftsbury Common, Vermont 1993 to 1996

 Greatest accomplishments were in the areas of fund raising, long range planning, increasing enrollment, diversifying the offerings, and in budgeting and the fiscal management of a budget of approximately \$2,000,000. Sterling College is a small, private, liberal arts college specializing in environmental studies and resource management.

Prince William Sound Community College President

Valdez, Alaska 1978 to 1992

 My accomplishments in this position include very good relations with both local and state government, fund raising, budget management, long range planning, and developing good community support. Programs were developed in areas such as developmental disabilities, secretarial sciences, fisheries, electronics, broadcasting, and many others. Of the \$3,000,000 budget, approximately \$1,000,000 came from fund raising efforts.

City of Valdez

Mayor

Valdez, Alaska 1984 to 1989

Valdez, Alaska

1977 to 1992

 Represented Valdez, coordinated City Council meetings, initiated long range planning, initiated budget planning for a \$32,000,000 budget, led five trade missions to Asia, and represented the City during the Exxon oil spill.

Valdez Hearing and Speech Center

Owner and Manager

 I provided hearing and hearing aid evaluations for the local community including the state center for the developmentally disabled and the public school system. I also did

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John S. Devens Page 3 some speech and language evaluations for the residents at the center for developmental disabilities. University of Alaska Learning Center Valdez, Alaska 1977 to 1978 Director Coordinated the center and made plans to create a community college. The Learning Center became Prince William Sound Community College. University of Houston Victoria Campus Victoria, Texas Assistant Professor of Special Education 1975 to 1977 Taught upper division and graduate courses in special education and in speech pathology and audiology. Directed the Speech Pathology program. Victoria Hearing and Speech Center Victoria, Texas **Owner and Operator** 1975 to 1977 I provided hearing and hearing aid evaluations for the community. Wichita State University Wichita, Kansas Assistant Professor Educational Psychology 1974 to 1975 I taught graduate courses in educational research, research design, and curriculum. Alaska Department of Health and Social Services Fairbanks, Alaska **Regional Audiology Supervisor** 1971 to 1973 · Responsible for a hearing conservation program in Northern Alaska, including budget preparation, project proposals, and supervision and training of staff. This position also included the evaluation and use of the ATS-1 communications satellite as a means of providing health and educational information to remote communities. Hearing and hearing aid evaluations were provided to a very diverse population. I originated the first hearing aid clinics in the state. University of Alaska Fairbanks, Alaska Lecturer 1971 to 1973 I taught upper division courses in speech and hearing sciences. Alaska Crippled Children and Adults Center Fairbanks, Alaska Director 1971 to 1973 I administered a community speech and hearing center and served as the audiologist for the center. Institute of Logopedics Wichita, Kansas Director of Audiology 1970 to 1971 I administered a clinical audiology program with a staff of five. Columbia College Columbia, South Carolina Director Speech and Hearing Program 1967 to 1970
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I directed an undergraduate program in speech correction and hearing rehabilitation.

Emory University School of Medicine Atlanta, Georgia Instructor in Surgery and Physical Medicine 1966 to 1967 • Electured physicians and nurses in techniques used in speech pathology and

 Lectured physicians and nurses in techniques used in speech pathology and audiology and provided clinical services at two hospitals.

Publications

Oil Spill A Community Perspective

Proceedings of the First International Conference on Offshore Drilling and Fisheries, Bergan, Norway (1990)

A Decade of Progress in Prince William Sound Panel member "Valdez Over the Last Decade" and "A Decade of Progress, A Vision of the Future" at the Partners in Prevention Symposium, Valdez, Alaska (1999)

Oil Spill Response and Prevention: What Still Needs to be Done Panel member at Legacy of an Oil Spill, EVOS Symposium, Anchorage, Alaska (1999)

Team Building

Session Chair at the International Oil Spill Conference, Seattle, Washington (1999)

Citizens Making Oil Transportation Safer in Alaska Speech given at the International Association of Public Participation in Phoenix, Arizona (1998)

A Citizens Advisory Program in Alaska Speech given at the International Forum for Oil-Polluted Sea Areas, Ploudalmezeau, France (1998)

Voyage on the ARCO Juneau Published in ManTimes (1997)

Oil Spill Preparedness: A Call for Action Paper published in The Municipal Advisor (1989)

The Exxon Valdez Oil Spill

Proceedings of the International Conference of 'Oiled Mayors', Valdez, Alaska (1989)

Acoustic Barriers: A Seminar on Public Law 94-142 Proceedings of NOISEXPO 78, Chicago, Illinois (1978)

Development of Educational Programs for Hearing Conservation Proceedings of NOISEXPO 77, Chicago, Illinois (1977)

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Effects of Noise Upon Student Performance in Public School Classrooms Proceedings of NOISEXPO 77, Chicago, Illinois (1977)

Dynamic Auditory Localization by Normal and Learning Disabled Children The Journal of the American Audiological Society, (1977)

"Hearing Loss After Ten Years of Exposure to Power Equipment Noise in Remote Northern Alaskan Villages Proceedings of NOISEXPO 76, (1976)

"Technical Note: An Apparatus for Exploring Dynamic Auditory Localization The Journal of the American Audiological Society, (1976)

"Acoustic Characteristics of the Public School Classrooms Constructed Between 1890 and 1960 Proceedings of NOISEXPO 75, Chicago, Illinois (1975)

How We Hear Media Kit, Alaska State Operated Schools, Anchorage, Alaska, (1972)

Protect Your Hearing Media Kit, Alaskan State Operated Schools, Anchorage, Alaska (1972)

My Child Film, South Carolina Education Television System, Columbia, South Carolina (1970)

You Are Not Alone Film, South Carolina Education Television System, Columbia, South Carolina (1970)

Parents Must Help Part 1

Film, South Carolina Education System, Columbia, South Carolina (1970)

Parents Must Help Part 2 Film, South Carolina Education Television System, Columbia, South Carolina (1970)

Future Sound Film, South Carolina Education Television System, Columbia, South Carolina (1970)

Alaska's Economic Future Speech given at Loussac Library for teachers, Anchorage, Alaska (1992)

Oil Spill and the Environment Speech given at Belmont University, Nashville, Tennessee (1991)

Legislative Issues in the 102nd Congress

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Speech given at the American Speech, Language and Hearing Association, Atlanta, Georgia (1991)

Trade Relations Between Alaska and the USSR Speech given to business group, Petropavlovsk, Kamchatka, USSR (1991)

Oil Spill, A Community Perspective Speech given to the Tiger Bay Club, Ocala, Florida (1990)

The Exxon Valdez Oil Spill

Series of speeches given at Portland Rotary, Portland, Oregon, Tacoma Chamber of Commerce, Tacoma, Washington, Seattle Chamber of Commerce, Seattle Washington and the Seattle Propeller Club, Seattle, Washington (1990)

Oil Spills and the Environment Speech given at Peninsula College (1990)

Oil Spill, the International Problem Series of speeches given in France (1989)

Oil Spill, a Community Perspective Paper delivered at the First International Conference of Off Shore Drilling and Fisheries, Bergan, Norway (1989)

Good Environment is Good Business Speech given to the Alaska Resource Development Council, Anchorage, Alaska (1989)

Foreign Trade Zone 108

Speech given at the Foreign Trade Zone Conference, Orlando, Florida (1988)

The Alaska Gas Line

Speech given at the International Trade Conference, Seoul, Korea (1988)

Economic Development

Speech given at the National League of Cities Convention, Seattle, Washington (1985)

Building for the Future

Speech given at the Resource Development Council Conference, Anchorage, Alaska (1985)

Maritime Education in Alaska Speech given at the Pacific Rim Maritime Conference, Honolulu, Hawaii (1981)

Dynamic Auditory Localization of Learning Disabled Children Scientific Exhibit, American Speech and Hearing Association Convention, San

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Francisco, California (1978)

Hearing Conservation - An Educational Approach in Alaskan Villages Paper delivered at the American Speech and Hearing Convention, Chicago, Illinois (1977)

Development of Education Programs for Hearing Conservation Paper delivered at NOISEXPO '77, Chicago, Illinois (1977)

Effects of Noise Upon Student Performance in Public School Classrooms Paper delivered at NOISEXPO '77, Chicago, Illinois (1977)

The Noise Level and How it Affects the Learning Disabled Child Paper delivered to the Texas Association for Children with Learning Disabilities, Houston, Texas (1976)

Communicative Disorders in the Public Schools Speech given at the Spring Meeting of La Bahia Guidance Association, Victoria, Texas (1976)

Hearing Loss After Ten Years of Exposure to Power Equipment Noise in Remote Northern Alaskan Villages Paper presented at NOISEXPO '76, New York, New York (1976)

Auditory Tracking Abilities in Learning Disabled Children Paper presented at the Coastal Bend Chapter of the Council for Exceptional Children Conference, Victoria, Texas (1975)

Acoustic Characteristics of Public School Classrooms Constructed between 1890 and 1960

Paper presented at NOISEXPO '75, Atlanta, Georgia (1975)

Hearing Conservation North of the Arctic Circle via ATS-1 Satellite Paper presented at the American Speech and Hearing Convention, Las Vegas, Nevada (1974)

A Survey of Sound Pressure Levels and Reverberation Times in Public School Classrooms

Paper presented at the American Speech and Hearing Convention, Las Vegas, Nevada (1974)

Rehabilitative and Identification Audiometery North of the Arctic Circle Paper presented at the Kansas Speech and Hearing Convention (1974)

Sensori-Neural Hearing Problems in Alaskan Natives: A New Problem

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Workshop presented at the Alaskan Speech and Hearing Association Convention, Fairbanks, Alaska (1972)

Communication Disorders in a Mentally Retarded Population

Three day workshop presented at the Pineland State School for the Retarded, Columbia, South Carolina (1970)

Hearing Conservation in a Preschool Population

Paper presented at the South Carolina Speech and Hearing Association Convention, Columbia, South Carolina (1969)

Issues Concerning the Use of Hypnosis in Speech Correction Paper presented to the Charleston Speech and Hearing Association, Charelston, South Carolina (1968)

Accomplishments

American Speech, Language, and Hearing Association 1967-present, certified in both Audiology and Speech, Language Pathology

Association of Vermont Independent Colleges 1993-1996, member of Executive Committee

Vermont Higher Education Council 1994-1996, member accreditation committee

Association of Vermont Independent Colleges 1994-1996, Secretary/Treasurer

Who's Who in America 1997-Selected for inclusion in the 51st edition.

The National Distinguished Service Registry 1990- for distinguished service in the profession of Speech, Language, and Hearing.

Who's Who Among Human Services Professionals 1988-1989-listed for work in the Speech, Language, and Hearing profession.

Who's Who in Education 1995-1996 - listed for work done in college administration.

Who's Who in the East

1995-1996 - my listing in Who's Who in the West was changed when I moved to Vermont.

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Who's Who in the World

1997-listed for accomplishments in education, government service, and the speech and hearing field.

Certificate of Appreciation

1978 - in recognition of a significant contribution to the American Speech and Hearing Association and to the profession of speech pathology and audiology.

Human Acoustics Seminar 1973 - successful completion of a seminar in human acoustics given by B&K Instruments. and the second second

The Propeller Club of the United States 1984 - charter member of the Port of Valdez, Alaska chapter of The Propeller Club of the United States.

Alaska Municipal League 1983-1988, Board of Directors

National League of Cities 1983-1988, member Small Cities Advisory Council and Community and Economic **Development Policy Committee**

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Alaska Resource Development Council 1988-1991, member Board of Directors

Alaska District Export Council 1988-1993, Appointed by the US Secretary of Commerce to the Board of Directors

Alaska-Korea Business Council 1988-1992, member Board of Directors

International Oiled Mayors Association 1989, organizer and member

Alaska Visitors Association 1980, President of Valdez Chapter

Valdez Chamber of Commerce 1987-Citizen of the Year

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Valdez Convention & Visitors Bureau 1987-"No Matter What it Takes" award for services to the visitor industry.

KCHU Public Radio 1987-"Silver Reel" award for support of Public Radio.

Governor's Council for the Handicapped and Gifted 1980-1982, Advocate for the Gifted and Chairman of the Finance Committee

Horsemanship for the Handicapped 1973-1978, National Chairman of the Advisory Committee

International Oticongress 1973 - participation in the 3rd International Oticongress in Copenhagen, Denmark.

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Explorers Club Member

Public Office 1980-1989, City Council, Valdez, Alaska 1981-1983, Mayor Pro-temp, City of Valdez 1984-1989, Mayor, City of Valdez 1990&1992, Candidate for US Congress Attachment C Resumes of Kinnetic Laboratories Personnel involved with LTEMP

5.1 Key Personnel

Janet Kennedy, A.S., KLI's Alaska Regional Manager, will continue to serve as the Project Manager, a Principal Investigator, and the primary Point of Contact for the project. She will oversee all aspects of the project and will lead the database and reporting tasks. Ms. Kennedy holds a degree in marine biology and oceanography. She has 16 years of experience in monitoring and assessment projects pertaining to the oil industry and their effects on the marine environment, 10 years of which have been in Alaska. Her experience includes monitoring programs on the U.S. Atlantic and Pacific coasts as well as the Gulf of Alaska, PWS, Cook Inlet, and the Beaufort Sea. She has participated in field sampling efforts for all types of projects ranging from intertidal beach sampling to deep water (2000 meter) sampling of the benthos. She currently serves as the Program Manager for the PWS RCAC LTEMP as well as Assistant Program Manager for the Municipality of Anchorage's Point Woronzof monitoring program. She was also the Assistant Project Manager for the programs performed by KLI for the Cook Inlet RCAC.

Mark A. Savoie, M.S., will perform as Assistant Program Manager and will continue to lead the laboratory coordination and quality assurance task. He will oversee the data analysis and interpretation and be heavily involved in report writing. Mr. Savoie is an expert in water and sediment quality issues. He has worked extensively throughout Alaska for 18 years, including involvement on a large number of projects in the Cook Inlet and Kodiak Island region and on a variety of EVOS hydrocarbon studies. He has served as the Principal Investigator on a large number of NPDES discharge monitoring programs, including those for Anchorage's Point Woronzof and the Drift River Ballast Water Treatment Plant (BWTP) discharges into Cook Inlet. He has been heavily involved in LTEMP since it began. Mr. Savoie has also served as Program Manager for the programs KLI has recently performed for the Cook Inlet RCAC as well as the program KLI performed for the Alaska Council of Trout Unlimited.

Technical oversight for the project will continue to be provided by **Patrick Kinney**, **Ph.D.**, who will act as a Principal Investigator on the project. Dr. Kinney has been involved in the LTEMP since the initial design phase. He is the founding principal of KLI who has nearly 30 years of experience in environmental studies. He has actively participated in more than 50 large applied programs designed to quantitatively assess impacts on the marine environment. His experience includes numerous programs in Alaska and ranges from program design and implementation to interpretation and presentation of results.

Gary Lawley will take the lead for the field logistics for the project. Mr. Lawley has extensive experience in sampling and logistics and has worked extensively in Alaska, including the PWS, Cook Inlet, Kodiak Archipelago, Alaska Peninsula, Beaufort Sea, and Gulf of Alaska areas. Mr. Lawley has held a technical support position at KLI for the last three years. He has participated in LTEMP sampling since March 1996 and is well versed in the requirements of the project. His prior experience is extensive and ranges from laboratory work to sampling fish in the Beaufort Sea to EPA Superfund cleanup and remediation work. Mr. Lawley will be joined in the field by senior KLI scientists such as Janet Kennedy, Mark Savoie, or **Dawn Reeder, B.S.** Ms. Reeder has a decade of experience working with environmental science projects in Alaska. She has served as field leader and a KLI research diver for the LTEMP in the past and has been involved with the LTEMP sampling since 1994.

The analytical aspects of the project will be administered by task-specific, doctorate-level Principal Investigators who have been involved with the LTEMP since its inception. **Guy Denoux**, **Ph.D.**, will continue to serve as internal project manager at GERG; he will lead the hydrocarbon analysis and fingerprinting tasks. He serves as the laboratory and data manager for the geochemical and environmental groups and as the systems manager for the analytic computer group. Dr. Denoux has many years of experience in environmental analyses and 10 years of experience with GERG at the assistant research scientist level. He will be assisted by **Terry Wade**, **Ph.D.**, the Deputy Director of Environmental Sciences at GERG. Dr. Wade, who has also been involved since the early days of the LTEMP, will provide additional technical or interpretive support as needed for the project. Dr. Wade has authored over 100 publications and brings expertise in the areas of environmental chemistry, marine organic geochemistry, chemical oceanography, and methods development to the project. **Ms. Grace Ekman**, **M.S.**, the quality assurance/quality control (QA/QC) manager, will continue to oversee the analytical work at GERG from a QA standpoint, as she has done since 1994. Her role at the laboratory is to ensure that all laboratory operations are consistent with good

laboratory practices, GERG's QA procedures and policies, and any applicable regulatory requirements. Ms. Ekman has 18 years of experience in analytical chemistry, the majority of which has pertained to QA.

While Database Management will be led by Janet Kennedy, additional support for this task and for any statistical analyses will be provided by **Peter Wilde**, **B.A.**, and **Gary Gillingham**, **B.A.**, both of KLI Santa Cruz. Mr. Wilde is a senior programmer and computer analyst capable of providing database and computer programming support to programs with a variety of data management needs. He has provided technical support for the LTEMP in the past, including providing report-writing expertise in Microsoft Access[®] when the database was transferred from Visual FoxPro[®]. Mr. Gillingham also has a history of providing support for the LTEMP, particularly in the area of statistical testing, interpretation, and report writing. He is a biologist specializing in marine intertidal and subtidal ecology with extensive experience in Alaska and California. His has considerable expertise in the area of statistical handling of biological and chemical data.

Additional support for all aspects of the project will be provided as needed by **Brenda Gumminger, B.S.** Ms. Gumminger has 13 years of experience in marine studies and computer science. She has worked for KLI in Anchorage for the last five years and has provided database, technical, and field support for a number of programs, including the LTEMP. Her familiarity with the LTEMP is extensive and covers field and documentation practices, data entry requirements and management, quality control, and report production.

5.2 Resumes of Key Personnel

Brief resumes are provided on the following pages for key personnel for the proposed project. More extensive resumes are available upon request.

JANET M. KENNEDY

Alaska Regional Manager Senior Environmental Scientist



EXPERTISE Water and Sediment Quality Evaluations Environmental Issues Related to Oil and Gas Development and Oil Spills NPDES Permitting and Discharge Evaluations Benthic Community Analysis Database Management

EXPERIENCE WITH FIRM

Ms. Kennedy is currently Regional Manager of Kinnetic Laboratories' office in Anchorage, Alaska. She is an environmental scientist holding a degree in Marine Biology and Oceanography with 16 years of experience in marine studies, primarily revolving around monitoring and assessment projects pertaining to the oil industry. She has participated in numerous multi-disciplinary long-term monitoring programs as well as impact assessment programs pertaining to oil and gas development. Ms. Kennedy has participated in numerous research surveys in the U.S. Atlantic and Pacific Oceans and areas of Alaska including Prince William Sound, the Gulf of Alaska, the Beaufort Sea, Cook Inlet, and Shelikof Strait. She has been with KLI for the last eight years.

- Program manager (1995-1999) and assistant program manager (1993-1994) for the Prince William Sound Regional Citizens' Advisory Council's Long-Term Environ-mental Monitoring Program. This program is designed to monitor the potential impacts of petroleum hydrocarbons on biota and sediments in Prince William Sound and the Gulf of Alaska. Mussels are used as bioindicators of hydrocarbon accumulation in the intertidal environments, while subtidal sediments, collected by both grab and divers, are analyzed to provide information on long-term inputs to the marine environment. The program has also included emergency sampling in response to spill events at the Alyeska Marine Terminal.
- Assistant program manager for the Cook Inlet Regional Citizens' Advisory Council's 1995 Environmental Monitoring Program, 1996 Shelikof Strait Program, 1997 Cook Inlet Sediment Characterization and Toxicity Study, and 1997 Kenai River and Estuary Investigation Project. These programs focused on the potential environmental effects of oil industry activities in Cook Inlet. Program designs have included monitoring subtidal sediment chemistry and toxicity, bioaccumulation in fish and mussels, benthic investigations, and use of bio-surrogates to monitor hydrocarbons in the water column.
- Assisted in the preparation of the Northstar Development draft and final EIS. Authored affected environment and impacts sections for the benthic infauna and sediment quality components of this large EIS prepared for offshore oil drilling on the North Slope of Alaska.
- Assistant program manager for the Municipality of Anchorage's NPDES 301(h) secondary treatment waiver monitoring program. Components of this study have included: water and sediment quality, evaluation of discharge criteria, ocean currents and dispersion, benthic invertebrates, and permit and regulatory compliance determinations. Another important part of this project was participation in the initial EIS and subsequent special studies and evaluations that

have been conducted in support of the Permit reapplication. Additional monitoring has also been performed for the Municipality of Anchorage in conjunction with the Eagle River Wastewater Treatment Facility.

- Participated in Prudhoe Bay Seawater Treatment Plant NPDES Monitoring for ARCO Alaska, Inc. This program included sampling and analysis of water and sediments from Prudhoe Bay during winter (through the ice) and summer (open water conditions).
- Assistant program manager for the 1991-92 Kuparuk Seawater Treatment Plant and Kuparuk Wastewater Treatment Plant NPDES monitoring programs. These programs involved effluent and receiving water monitoring of toxicity and water quality parameters.
- Assistant science manager/field leader for a large number of studies performed for EXXON in response to the T/V EXXON VALDEZ oil spill. The programs included water and sediment quality assessments, fate and effects studies, and clean-up and treatment efficacy studies. She held the position of chief scientist for the 1990 Bioremediation Monitoring Program, a five-month study jointly funded by EPA, ADEC, and EXXON. Ms. Kennedy was also heavily involved in the report writing and database management efforts for these programs.
- Support personnel for a number of programs involving Natural Resource Damage Assessment and oil spill environmental response planning. Ms. Kennedy authored a variety of sampling protocols for scientific response to potential oil releases in Prince William Sound and on the North Slope.
- Laboratory supervisor, data manager, and a field leader involved in a large MMS-funded five-year California OCS monitoring program involving soft- and hard-bottom community assessment along with chemical assessment and oceanography.
- Task coordinator for the MMS-sponsored U.S. North, Mid-, and South Atlantic Slope and Rise Studies and the Georges Bank Monitoring Program. These programs involved intensive study of deep water benthic communities and the potential impacts of oil development on these communities.
- Senior taxonomist for an NPDES monitoring program conducted in the coastal waters of Massachusetts offshore from a nuclear power plant discharging thermal effluent.

EDUCATION

A.S., Marine Biology and Oceanography, Southern Maine Vocational Technical Institute, 1982

PROFESSIONAL AFFILIATIONS AND CERTIFICATIONS

Member of the American Society of Testing and Materials (ASTM)

MARK A. SAVOIE

Vice-President

Senior Environmental Scientist

KINNETIC ABORATORIE INCORPORATED

EXPERTISE

Oceanography / Ocean Circulation NPDES Discharge Evaluations Coastal and Nearshore Sediment Processes Water and Sediment Quality Impact Assessment Oil Spill and NRDA Environmental Studies

EXPERIENCE WITH FIRM

Mr. Savoie is a senior physical oceanographer/coastal engineer and serves as the Vice President for Kinnetic Laboratories, Inc. (KLI). He has an extensive background in physical oceanography and coastal processes and is responsible for conducting and managing oceanographic, NPDES, water/sediment quality, and nearshore sediment dynamic studies.

- Project manager and co-principal investigator for the Municipality of Anchorage's NPDES 301(h) secondary treatment waiver monitoring program, a project now in its fourteenth year. Components of this study have included: water and sediment quality, evaluation of discharge criteria, ocean currents and dispersion, invertebrates, and permit and regulatory compliance determinations. Another important part of this project was participation in the initial EIS and subsequent special studies and evaluations that have been conducted in support of the Permit reapplication.
- Member of the team preparing the Northstar Development EIS for offshore oil drilling on the North Slope of Alaska. Authored affected environment and impacts sections for the oceanography and sediment and water quality components of the EIS. Also performed NPDES Ocean Discharge Evaluation Criteria and plume modeling to assist with EIS preparation and design modifications for this project.
- Program manager for the Cook Inlet Regional Citizens' Advisory Council's (RCAC) 1997 Cook Inlet Sediment Characterization and Toxicity Study and 1997 Kenai River and Estuary Investigation Project. These programs focus on the potential environmental effects of oil industry activities in Cook Inlet. Program designs have included monitoring subtidal sediment chemistry and toxicity as well as benthic investigations. Heavy involvement with other Cook Inlet RCAC programs performed prior to 1997 by KLI, which included bioaccumulation in fish and mussels, sediment quality, and the use of bio-surrogates to assess hydrocarbon contaminant levels in the water column.
- Senior scientist on the Prince William Sound RCAC Long-Term Environmental Monitoring Program which was designed to monitor the potential impacts of petroleum hydrocarbons on biota and sediments in Prince William Sound and the Gulf of Alaska. This program has been performed by KLI since 1993.

- Principal investigator and project manager for the Prudhoe Bay Waterflood Physical Processes Monitoring Program from 1982-85. This study was conducted to verify EIS predictions and determine the environmental impact of the West Dock Causeway and Waterflood Extension. The study evaluated the effects of the causeway on water circulation, temperature, and salinity patterns and their effects on biological resources. The study also included littoral transport studies to determine the effect of the causeway on shoreline and nearshore accretion and erosion patterns.
- Project manager and principal investigator for the 1991-92 Kuparuk Seawater Treatment Plant and Kuparuk Wastewater Treatment Plant NPDES monitoring programs. These programs involved effluent and receiving water monitoring of toxicity and water quality parameters.
- Principal investigator for the oceanographic and sedimentation components of the Proposed Lisburne Development EIS. This study involved determining the environmental impact of a proposed causeway and alternatives in Prudhoe Bay. Wind and wave hindcasting was performed to determine the effects of waves and currents on the proposed structure. Littoral transport of sediments was examined through use of Corps of Engineers littoral transport and sedimentation models.
- Project manager during 1987 and assistant project manager during 1985-86 for the Kuparuk Waterflood NPDES monitoring program. This study included water and sediment quality, benthic invertebrate and fish monitoring components, and a discharge dye dispersion sampling program.
- Senior scientist and assistant project manager in charge of marine studies for the design of the new City of San Diego wastewater outfall off Mission Bay and task manager for both the oceanography and water quality tasks. He was also the physical oceanography task manager for the marine EIR/EIS NEPA documentation for the City of San Diego Clean Water Program 20-year and 40-year infrastructure planning for water reclamation and disposal facilities, which included three major outfalls.
- Principal investigator for the physical oceanographic components of a large, MMS-funded five-year California OCS monitoring program offshore of Point Conception.
- Project manager during 1988-90 for the Endicott NPDES Monitoring Program. This study included water and sediment quality, benthic invertebrates, and dye dilution and dispersion studies including computer modeling of the effluent discharge.
- Senior scientist for the physical oceanographic and water quality components of the EIS for Cities Service's proposed San Miguel project in the Santa Maria Basin.
- Senior scientist involved in two wind and wave hindcasting studies: one for Saint Paul Island, Alaska, which examined a failed breakwater, and the other which examined the failure of a bulkhead on Kodiak Island, Alaska.
- Co-principal investigator for the Beaufort Sea Mesoscale Circulation Design Study that was conducted for the National Oceanic and Atmospheric Administration (NOAA) and the Minerals Management Service (MMS).

- Physical oceanographic and sediment processes task leader for the Peard Bay NOAA/OCSEAP ecosystem study along the Chukchi sea coast.
- Contributed his expertise in the areas of field work, analysis, and data interpretation as a participant of the EXXON U.S.A. physical oceanographic program in the Point Thomson offshore lease areas of the Beaufort Sea.
- From Spring 1989 through 1991, Mr. Savoie managed a large segment of the scientific studies being carried out on the T/V *EXXON VALDEZ* oil spill for EXXON. In addition to scientific interpretation and input, Mr. Savoie was involved in field operations and database management associated with these extensive studies.
- Co-principal investigator on the oceanographic and sediment processes sections of the Comprehensive Marine Report for the West Dock Causeway and Waterflood Extension. This report was prepared for the U.S. Corps of Engineers and emphasized impacts of the causeway and comparisons with EIS predictions.

EDUCATION

M.S., Ocean Engineering; Rosenstiel School of Marine and Atmospheric Science, University of Miami; 1981 B.S., Atmospheric and Oceanic Science; College of Engineering, University of Michigan; 1979

PATRICK J. KINNEY

Principal



EXPERTISE

Senior Environmental Scientist Senior Project Management Program Design and Implementation

EXPERIENCE WITH FIRM

Dr. Kinney is a founding principal of Kinnetic Laboratories and a principal of an affiliated analytical and toxicity testing laboratory firm, ToxScan, Inc. In addition to administrative duties, Dr. Kinney remains an active scientist, participating heavily in project design, data interpretation, and report preparation. Dr. Kinney received his Ph.D. in Chemical Engineering and his post-doctorate in Oceanography. He has 35 years of professional experience focused on environmental issues such as water quality, sediment quality, and oceanographic studies.

- Designed and/or served as principal investigator on over 75 NPDES monitoring studies involving effects of point source discharges, as well as other studies involving nonpoint discharges of spills and hazardous materials, such as the T/V *Exxon Valdez* oil spill (EVOS). During the EVOS scientific response, designed and/or provided doctorate-level support for a variety of programs involving water and sediment quality, fate and effects, and clean-up and treatment efficacy studies.
- Program manager and principal investigator on the initial Long-Term Environmental Monitoring Program (LTEMP) performed by KLI for the Prince William Sound Regional Citizens' Advisory Council. Helped design the initial LTEMP (1993) and has served as principal investigator for the six years that KLI has performed this program.
- Project manager responsible for preparing the crucial oceanographic and biological sections of the Municipality of Anchorage 301(h) waiver application, including supporting studies in Cook Inlet. He assisted in subsequent special studies during the application review, and after the NPDES permit was granted, he initiated the initial 5-year NPDES monitoring program. In more recent years, has provided additional support for this program by working on special problems such as metals water quality criteria and plant BOD performance.
- Principal investigator for the University of Alaska for the early oceanographic studies of Cook Inlet; also led the major fate and effect pollution studies in Alaska associated with petroleum industry developments. These programs included extensive oceanographic studies performed for six years in the deep Arctic Ocean and the first baseline marine ecosystem studies sponsored by EPA and SeaGrant covering the area from Barrow to Prudhoe Bay.
- Principal investigator for KLI on additional Alaskan arctic projects for NOAA, including the physical oceanographic studies carried out along the Beaufort coast; the Peard Bay ecosystem studies on the Chukchi Sea arctic coast; and the offshore physical oceanographic mooring program on the open Chukchi Sea coast (NOAA). Performed the MMS/NOAA-sponsored ecosystem characterization and synthesis project for the North Aleutian Shelf area. Performed large coastal physical and coastal engineering studies carried out in the Point Thomson area just east of the

Endicott study area for EXXON, U.S.A. Managed a geochemical sediment sampling study carried out for several-oil-companies in the Beaufort Sea, from Barrow to the Canadian border.

- Participated in NPDES monitoring work for the ARCO Kuparuk, ARCO Prudhoe, and BP Endicott developments, as well as assisting in a review report for Alyeska of their NPDES monitoring results for submittal to EPA.
- Managed a physical oceanographic study associated with discharges from production platforms offshore Santa Barbara. Designed and performed multi-year studies carried out on the California OCS on the effect of drilling fluids and produced water discharged from exploratory and production platforms.
- Instrumental in developing the basic study designs and techniques now used in large urban runoff studies in San Francisco Bay, including the first large programs for Santa Clara and Alameda Counties. Include development of special automatic sampling stations which integrate hydrologic information to achieve flow-proportioned sampling, instrumentation of sub-basins by land use categories, synthesis of total pollutant loading by modeling, and parallel instrumentation checks of large downstream drainage channels and streams.
- Project manager or chief scientist on a number of other stormwater studies, including Monterey Bay area studies, and stormwater management plan studies with Woodward Clyde Consultants for Naval Facilities in Southern California
- Key participant in the toxicological study of agricultural drain water for the San Luis Drain project, involving a large number of Delta and San Francisco Bay species
- Project manager for an 18-month study involving instrumentation of the Sacramento River Delta for currents, suspended load, salinity, and other parameters associated with salinity intrusion control studies. Project manager for instrumentation of the stormwater monitoring program for the Sacramento regional study.
- Project manager for the City and County of San Diego stormwater monitoring project, which includes multi-year sampling from 15 automatic monitoring stations distributed according to location, land use, and receiving water categories, along with modeling interpretations
- Project manager and chief author of the team responsible for the marine impact EIR/EIS documentation for the City of San Diego metropolitan area infrastructure planning study which involved 20- and 30-year water reclamation and disposal facilities.

EDUCATION

Post-doctorate, Scripps Institution of Oceanography, University of California, San Diego; 1966 Ph.D., Engineering; Iowa State University; 1963 B.S., Engineering, South Dakota School of Mines, 1957

GARY G. LAWLEY Research Technician

Alaska Field Operations



EXPERTISE

Field Operations/Logistics Environmental Assessment and Monitoring Programs

EXPERIENCE WITH FIRM

Mr Lawley currently serves as a field technician for the Kinnetic Laboratories, Inc. (KLI) office in Anchorage, Alaska. As a technician on the KLI staff since 1995, he works closely with project managers to ensure field operations follow study specifications and are performed in the most efficient and effective manner. He has extensive experience in the implementation of a wide range of environmental studies. His duties include logistics, conducting shipboard operations, and assuring that the chain of custody and sample handling procedures are carried out according to appropriate standards. He has thirteen years of field experience in Alaska and has worked in areas including Prince William Sound, the Gulf of Alaska, Cook Inlet, the Chukchi Sea, and the Beaufort Sea.

- Field technician for the Prince William Sound Regional Citizens' Advisory Council's Long-Term Environmental Monitoring Program. This on-going program is designed to monitor the potential impacts of petroleum hydrocarbons on biota and sediments in Prince William Sound and the Gulf of Alaska. Mussels are used as bioindicators of hydrocarbon accumulation in the intertidal environments, while subtidal sediments, collected by both grab and divers, are analyzed to provide information on long-term inputs to the marine environment.
- Field technician for the Cook Inlet Regional Citizens' Advisory Council's 1996 Shelikof Strait Program, 1997 Cook Inlet Sediment Characterization and Toxicity Study, and 1997 Kenai River and Estuary Investigation Project. These programs focused on the potential environmental effects of oil industry activities in Cook Inlet. Program designs included monitoring mussels for bio-accumulation of hydrocarbons in 1996 and examining subtidal sediment chemistry and toxicity in 1997.
- Dive tender on several NPDES monitoring programs for various Log Transfer Facilities in Prince William Sound, the Gulf of Alaska, and the Kodiak Archipelago. These subtidal bark accumulation programs are performed by divers who record bark accumulation levels and biota encountered at fixed points along multiple transects. Also entailed deployment and maintenance of underwater video, underwater single-side band communication, and specialized dive gear.
- Field technician for the Municipality of Anchorage's NPDES 301(h) secondary treatment waiver monitoring program, a project now in its thirteenth year. Components of this study have included: water and sediment quality, evaluation of discharge criteria, ocean currents and dispersion, invertebrates, and permit and regulatory compliance determinations. Subsequent special studies and evaluations have been conducted in support of the Permit reapplication.
- Field technician for the Alaska Council of Trout Unlimited's Kenai River Estuary Sediment and Water Quality Investigations. This program employed a sediment

quality triad approach examining chemical, toxicological, and biological parameters to help evaluate the levels and potential effects of contaminant discharges on the Kenai River Estuary and its biota.

- Field technician supporting a bathymetric survey of a possible Log Transfer Facility to be sited at Cape Yakataga. Mobilized and expedited equipment and crew to a remote location. Formulated site-specific safety/contingency plan; employed small skiff and hand-held sonar to aquire GPS-located and tidallyadjusted water depths for a highly dynamic Gulf of Alaska beach site.
- Field technician performing a sediment survey of a private subtidal lease in Ketchikan, Alaska. This program included confidential analysis of grab sampled sediment for metals, hydrocarbons, and dioxins.
- Field technician for the Municipality of Anchorage's Eagle River Waste Water Treatment Plant's NPDES permit. In support of the permit's renewal, a fourseason analysis of Eagle River's ambient metal load was calculated upstream from the treatment plant and compared to downstream loads. Flow-based composite samples of plant effluent were also analyzed for chronic and acute toxicity.
- Field technician five seasons for a study of anadromous fish in the nearshore environment of the Beaufort Sea. Study parameters included recruitment, genetic distribution, fecundity and migration habits of five target species correlated with marine/esturine temperature and salinity gradients. Responsible for the siting, installation, and maintence of Fyke nets, identification and tagging of fish, collection of water quality data, collection of genetic samples, and the operation and maintenance of support skiffs. A variety of tagging methods were used to identify Fyke net captured and recaptured fish.
- Laboratory technician for the University of Alaska at Anchorage. Responsible for the maintenance of the student microbiology labs. Included isolation, identification, and culture of 20 to 30 reference cultures of bacteria; growth media production; purchasing lab supplies; maintaining microscopes; basic instruction; and proctoring of exams.
- Field technician on an industry-funded cleanup and site remediation of an oil processing facility at Nikiski, Alaska. Confined space supplied air work cleaning and dismantling small cracking chambers, millon gallon oil storage tanks, and sludge ponds. Level B and C personal protective equipment required daily.
- Field technician on an EPA Superfund cleanup site along Ship Creek in Anchorage, Alaska. This RCRA-mandated remediation of a uncontrolled hazardous waste and hazardous materials site necessitated levels B and C personal protective equipment and methods. Program designed to control and dispose of site hazards including PCB's, dioxins, dibenzofurans, heavy metals, and hydrocarbons.

CERTIFICATIONS

U.S.C.G. Western Rivers. Sixpack. License to operate charter vessels. CPR, First Aid, and Confined Space Entry Certified HAZWOPER 40 hr. Training in accordance with 29 CFR PADI Diver Certification, Open Water

DAWN R. REEDER

Environmental Scientist



EXPERTISE

Water and Sediment Quality Evaluations Marine and Terrestrial Ecosystem Surveys Site Assessment Studies Bioremediation; Soil and Groundwater Remedial Systems Hazardous Waste and Underground Storage Tank Removals

EXPERIENCE WITH FIRM

Ms. Reeder is an environmental scientist holding a degree in Biological Sciences with 10 years of experience in environmental studies. She has worked for KLI since 1989 on a variety of projects. Her responsibilities include field sampling, data analysis, report preparation, and technical editing. Ms. Reeder is an active research diver for KLI. She has worked extensively in Alaska in areas including Prince William Sound, the Gulf of Alaska, the Pribilof Islands, the Beaufort Sea, Cook Inlet, and Shelikof Strait.

- Field scientist and/or research diver for the Prince William Sound Regional Citizens' Advisory Council's Long-Term Environ-mental Monitoring Program. This program is designed to monitor the potential impacts of petroleum hydrocarbons on biota and sediments in Prince William Sound and the Gulf of Alaska. Mussels are used as bioindicators of hydrocarbon accumulation in the intertidal environments, while subtidal sediments, collected by both grab and divers, are analyzed to provide information on long-term inputs to the marine environment. The program has also included emergency sampling in response to spill events at the Alyeska Marine Terminal.
- Field scientist for the Cook Inlet Regional Citizens' Advisory Council's 1995 Environmental Monitoring Program and the 1996 Shelikof Strait Program. These programs focused on the potential environmental effects of oil industry activities in Cook Inlet. Program design included monitoring subtidal sediment chemistry and toxicity, bioaccumulation in fish and mussels, benthic investigations, and use of bio-surrogates to monitor hydrocarbons in the water column.
- Research diver and lead scientist on numerous NPDES monitoring programs for various Log Transfer Facilities in Prince William Sound, the Gulf of Alaska, and the Kodiak Archipelago. Divers record bark accumulation levels and biota encountered at fixed points along multiple transects.
- Research diver and lead scientist performing a bathymetric survey of a possible Log Transfer Facility to be sited at Cape Yakataga. This near-shore survey was performed in a highly dynamic area of the Gulf of Alaska in near-marginal conditions.
- Scientist performing field sampling and other support for the Municipality of Anchorage's NPDES 301(h) secondary treatment waiver monitoring program. Components of this study have included water and sediment quality, evaluation of discharge criteria, ocean currents and dispersion, benthic invertebrates, and permit and regulatory compliance determinations.

- Participated in Prudhoe Bay Seawater Treatment Plant NPDES Monitoring for ARCO Alaska, Inc. In particular, provided field support for collection of benthic sediments from Prudhoe Bay during winter (through the ice).
- Field scientist for a number of studies performed for EXXON in response to the T/V EXXON VALDEZ oil spill. Her responsibilities included sampling sediments, water, and benthic infauna for fate and assessment and cleanup efficacy studies. During shoreline treatment monitoring studies, Ms. Reeder filmed underwater video to document plume dispersion and sample collection.
- Participated in Remedial Investigation/Feasibility Studies (RI/FS) throughout Alaska as a part of the U.S. Department of Defense (DOD) Installation Restoration Program. Prepared RI/FS study plans and reports, participated in all phases of ongoing field investigations (site reconnaissance and installation and sampling of soil borings and groundwater monitoring wells), and performed Risk Assessments prioritization of 23 RI/FS hazardous waste sites using the DOD Automated Defense Priority Model.
- Supervised subcontractor field crews and served as site Health and Safety Officer during the first phase of a cleanup effort of several abandoned drum dump sites on the Pribilof Islands. Duties included field characterization and laboratory sampling of drum contents and supervision of the consolidation and staging of wastes for future transport.
- Performed numerous site investigations logging soil borings and collecting soil samples for chemical and geotechnical analyses. Installed, developed, and sampled groundwater monitoring wells to evaluate the extent of subsurface soil and groundwater contamination resulting from fuel releases.
- Environmental scientist performing various site assessments. Duties included records searches, interviews, site reconnaissance, and soil field screening to evaluate past activities and potential presence of hazardous materials.

EDUCATION

B.S. Biological Sciences, Stanford University, Palo Alto, California, 1990

CERTIFICATIONS

NAUI Diver Certifications: Openwater I Certification, 1986
American Red Cross Adult CPR and First Aid
40 Hour Hazardous Materials Health and Safety Training
8 Hour Supervisory Hazardous Materials Health and Safety Training
8 Hour Entry to Confined Spaces Training

PETER M. WILDE

Data Systems Manager



EXPERTISE Statistical Analysis Database Management Computer System Management System and Software Design

EXPERIENCE

Mr. Wilde has served as a computer analyst and physicist at Kinnetic Laboratories since 1979. As computer analyst, he has been responsible for data processing, programming, and statistical analysis for a variety of environmental studies. He is skilled in working with a wide range of computer hardware, from micro- and mini-computers to large mainframe systems. Using his expertise in analyzing sophisticated data sets, he designs the software required to address and simplify complex physical, biological, and environmental problems. His responsibilities include computer system and data management, data processing, sensor interfacing, statistical analyses, time-series analyses, and interpretation of results.

- Provides data and statistical analysis support for fate and effects and EPA-required studies for a number of industrial and municipal point and nonpoint-source discharge programs, including the Municipality of Anchorage's Point Woronzof NPDES monitoring program. Performs statistical testing and provides data submittals for EPA in the Ocean Data Evaluation System (ODES) format. Has developed software for monitoring storm drain run off in Campbell CR-10 microloggers, including interfacing to various remote flow and depth sensors.
- Provides data and statistical analysis support for a variety of environmental studies including a long-term monitoring program in Alaska to determine effects of petroleum industry operations on sediment and biota. Provided initial database design, statistical design and analysis, and data reporting support for this program which has been performed by KLI since 1993 for the Prince William Sound Regional Citizens' Advisory Council.
- Developed and wrote a majority of the specialized software used in KLI's oceanographic data analyses, data processing, and computer modeling efforts. Participated in physical oceanographic studies along the coasts of Alaska and California. Performed as data system manager and computer analyst in support of production research for a study of EXXON's Point Thompson Unit on the Beaufort Coast of Alaska. Served as data system manager for several ecological and oceanographic studies performed by KLI for NOAA in areas of Alaska including the Beaufort Coast, Chukchi Sea Coast, Resurrection Bay, and Cook Inlet.
- Data systems manager for the physical oceanographic studies performed for ARCO Oil and Gas Company off Coal Oil Point, California. This study involved the use of current meters, hydrographic profiling, and drogues. Other projects in California include a

PETER WILDE

large physical study of saltwater intrusion into the San Francisco Bay-Delta and an analysis of current meter data being collected to evaluate potential dredge disposal sites (both studies for the San Francisco Corps of Engineers).

- Analyzed offshore wind, wave, and current meter data as part of a 5-year MMS study of offshore development along the California Coast.
- Developed a complete set of data processing programs used for KLI's benthic infaunal analysis studies involving soft-bottom benthic communities. Also responsible for computer data analysis for hard-bottom benthic studies for Carmel and Santa Cruz monitoring studies, the Texaco Jade and Platform Harvest projects, and a long-term California OCS monitoring study.
- Has written extensive software to manage and analyze large multi-year data bases for the MMS rocky intertidal ecological study in central and northern California and the MMS oil seep study in the Santa Barbara Channel.

EDUCATION

B.A., Physics and Information Sciences, University of California, Santa Cruz; 1978.

GARY GILLINGHAM

Senior Marine Biologist/Taxonomist

KINNETIC LABORATORIES INCORPORATED

EXPERTISE Invertebrate Taxonomy Benthic Community Analysis NPDES Permitting and Discharge Evaluations Water and Sediment Quality Impact Evaluations Environmental Issues Related to Oil and Gas Development

EXPERIENCE WITH FIRM

Mr. Gillingham is a staff invertebrate taxonomist and biologist with 20 years of experience and expertise on the biology of faunas living in marine soft-substrates. As a senior staff biologist and technical writer for Kinnetic Laboratories since 1981, he has extensive experience in invertebrate taxonomy, field sampling, data analysis, and report production. His activities have also involved him in other areas besides biology, such as associated project tasks that require sampling for sediment and water quality chemistry data.

- Marine biological task leader for NPDES 301(h) applications for North San Mateo, Oceanside, Encina, Escondido/San Elijo, Oxnard, and Watsonville (California). Has performed supporting studies of the marine benthos for the NPDES monitoring program for the Municipality of Anchorage's Point Woronzof discharge as well.
- Assisted in the preparation of the Northstar Development draft and final EIS. Authored affected environment and impacts sections for the benthic infauna components of this large EIS prepared for offshore oil drilling on the North Slope of Alaska.
- Program manager for a baseline survey in Nigeria, Africa for Mobil Producing Nigeria Ultd. Two separate offshore oil field production units, Oso Field and Ubit Field, which were scheduled for expansion, were surveyed for baseline information. Conducted sampling for benthic fauna, fish, and zooplankton as well as water column profiling for major water quality parameters. Collected sediment cores and grabs for sediment trace metal and organic chemistry analyses.
- Has Provided statistical analysis and interpretive support for a variety of environmental studies including a long-term monitoring program in Alaska to determine effects of petroleum industry operations on sediment and biota. Provided initial statistical design support and interpretation of results during the early stages of the program which has been performed by KLI since 1993 for the Prince William Sound Regional Citizens' Advisory Council.
- Biological task leader for an EIS and associated field studies for a proposed desalination plant at Marina, California.
- Field scientist and task leader for invertebrate communities evaluation for the Prudhoe Bay Seawater Treatment Plant NPDES Monitoring for ARCO Alaska, Inc. Program includes sampling and analysis of water and sediments from Prudhoe Bay. Spring sampling involves working through the ice for collection of water quality, benthic

samples, and oceanographic measurements. Summer sampling includes oceanographic measurements and water sample collection.

- Senior taxonomist from 1988 through 1990 for the Endicott NPDES Monitoring Program. This study included water and sediment quality, benthic invertebrates, and dye dilution and dispersion studies including computer modeling of the effluent discharge.
- Participated on over two dozen separate studies in the Monterey and San Francisco Bay regions involving either baseline surveys, NPDES monitoring, 301(h) permit preparation, dredging and wetlands studies, as well as EIS/EIR related field sampling and report preparation.
- Task manager for marine biology for the Ecological Assessment of Naval Air Station, Alameda, a large multi-disciplinary project for PRC Environmental Management, Inc. of San Francisco.
- Benthic invertebrate task leader for the Kuparuk Waterflood NPDES monitoring program from 1985 through 1987. This study included water and sediment quality, benthic invertebrate and fish monitoring components, and a discharge dye dispersion sampling program.
- Involved with the numerous scientific studies associated with the T/V *Exxon Valdez* Oil Spill. His involvement began within the first days of the spill response. Assisted in setting up the water and sediment chemistry sampling operations in Prince William Sound, then served as the principal field investigator on subsequent sediment study cruises through the winter of 1990. Served in the same capacity for the sediment and water chemistry components of a crustacean resource study within the Sound.
- Benthic invertebrate task leader for the Peard Bay NOAA/OCSEAP ecosystem study along the Chukchi sea coast from 1982 through 1984.
- Prior to working with Kinnetic Laboratories, Mr. Gillingham worked as a marine biologist for private and state agencies. He has worked on many community analysis and life-history monitoring studies throughout southern and central California, as well as several areas in Alaska. He served as a staff research assistant and taxonomist at Moss Landing Marine Laboratories for six years and worked also as a part-time independent consultant and taxonomist during that time.

EDUCATION

B.A., Zoology; California State University, Long Beach; 1973 A.A.; Art, Fresno City College, Fresno, California; 1969

SPECIAL TRAINING AND PROFESSIONAL AFFILIATIONS

Southern California Association of Marine Invertebrate Taxonomists (SCAMIT), 1981-present

BRENDA G. GUMMINGER

Environmental Scientist/ Computer Analyst



EXPERTISE Database Management, Processing, and Analysis Environmental Issues Related to Oil and Gas Development and Oil Spills NPDES Permitting and Discharge Evaluations Technical Editing and Writing

EXPERIENCE WITH FIRM

Since her employment began at KLI in 1994, Ms. Gumminger has participated in several major projects including Prince William Sound Regional Citizen's Advisory Council's Long-Term Environmental Monitoring Program; Cook Inlet Regional Citizen's Advisory Council's environmental monitoring programs; and the EPA-required environmental monitoring for the Municipality of Anchorage's secondary wastewater discharge. Although her primary tasks on these projects involve database management and report writing and editing, she also provides field sampling, quality control, and management support. Ms. Gumminger holds a degree in marine biology and has 13 years of experience in marine studies and computer science. She has participated in research surveys in the U.S. Atlantic Ocean and areas of Alaska including Prince William Sound, the Gulf of Alaska, and Cook Inlet.

- Provided scientific and computer analyst support for the Prince William Sound Regional Citizens' Advisory Council's Long-Term Environmental Monitoring Program. This program is designed to monitor the potential impacts of petroleum hydrocarbons on biota and sediments in Prince William Sound and the Gulf of Alaska. Tasks include field sampling and documentation, data management and processing, quality control, technical reporting and editing, and overall administrative support for the program.
- Provided scientific and database support for the Cook Inlet Regional Citizens' Advisory Council's 1995 Environmental Monitoring Program, 1997 Cook Inlet Sediment Characterization and Toxicity Study, and 1997 Kenai River and Estuary Investigation Project. These programs focused on the potential environmental effects of oil industry activities in Cook Inlet. Tasks have included logistical support, sample documentation, quality control, data management, and reporting.
- Scientist and technical writer/editor for the Municipality of Anchorage's NPDES 301(h) secondary treatment waiver monitoring program. This comprehensive study includes the production of a large-scale annual report providing all in-plant monitoring results as well as those from ambient water monitoring in Cook Inlet. Provided field sampling, data tabulation and synthesis, quality control, and technical writing support.
- Database coordinator for a multidisciplinary database containing environmental damage assessment data collected by a number of scientific teams in response to the T/V EXXON VALDEZ oil spill. Responsibilities included database design and development involving interaction with program scientists and other data management personnel to determine the optimum database design; contribution to the design and development of field documentation and sample tracking procedures for integration with existing database; and interaction with

- laboratories and principal investigators to ensure database structure compatibility and data submission and revision accuracy. Included all aspects of database management including data tracking, loading, reformatting, manipulation, validation, and report generation. Database tasks were performed in R:BASE and/or ORACLE using SQL. Ms. Gumminger was also responsible for supervising and coordinating the work of other contract team members by providing guidance and reviewing final products; implementing quality control procedures; focusing on the development and modification of new or existing Standard Operating Procedures (SOPs); and field support involving water and sediment sampling both nearshore and onshore.
- Data programmer/analyst responsible for application and database design, development, and management. Included work on a large-scale project to develop an extensive relational database of geochemical data involving the digitizing of sample locations in AutoCAD and transferring this location data to an R:BASE database. Developed a database and application to store library reference information involving development of front end data entry and data editing screens for end users as well as linking several command files to generate reports from the database. Also provided support for Alaska Clean Seas using and developing their spill response GIS/Database.
- Marine technician and data entry technician providing laboratory and field support for both industrial and government-sponsored programs, many of which involved assessing impacts of oil-related development on the marine ecosystem. Her laboratory responsibilities included sediment grain-size analysis (including pipette analysis), preparation of sediment for Carbon, Hydrogen, Nitrogen (CHN) analysis, benthic sorting, identification and biomass data collection of invertebrates and marine algae, quality control, and training and supervising others in the above tasks. Her field experience involved offshore benthic sampling in the U.S. Atlantic Ocean using various equipment. Other responsibilities included data entry, data processing, and statistical analyses.
- Proficiency with computers covering a wide variety of conventional software applications and platforms. Capable of using both Macintosh and IBM-compatible computers and either DOS or Windows operating systems. Experienced in managing databases using R:BASE, FoxPro, and Microsoft Access database management software as well as ORACLE using SQL computer language. Has also managed data using Excel, QuattroPro, and Lotus 123 spreadsheets. Fluent in the use of Microsoft Word and WordPerfect word processing software as well as developing graphics using CorelDraw.

EDUCATION

B.S. Marine Biology, University of Massachusetts-Dartmouth, 1986

CERTIFICATIONS

National Association of Underwater Instructors (NAUI) Openwater I Dive Certification, 1983

Dr. Guy J. Denoux Laboratory Manager

Specialties: Laboratory Manager Data Manager-Geochemical and Environmental Data Systems Manager-Analytical Computer Systems

Education: B.S. (Biological Sciences) University of New Orleans, 1973; M.S. (Zoology and Physiology) Louisiana State University, 1976; Ph.D.(Oceanography), Texas A&M University, 1984.

Professional Experience: Assistant Research Scientist, Geochemical and Environmental Research Group, Texas A&M University, 1989-Present; Research Associate, Dept. of Oceanography, Texas A&M University, 1984-1989; Research Assistant, Dept. of Oceanography, Texas A&M University, 1982-1984, Graduate Teaching Assistant, Dept. of Oceanography, Texas A&M University, 1981; Research Assistant, Dept. of Oceanography, Texas A&M University, 1981; Research Assistant, Dept. of Oceanography, Texas A&M University, 1981; Graduate Teaching Assistant, Dept. of Oceanography, Texas A&M University, 1980; Research Assistant, Systematics Collection, Dept. of Oceanography, Texas A&M University, 1980; Graduate Teaching Assistant, Dept. of Oceanography, Texas A&M University, 1980; Research Assistant, Dept. of Oceanography, Texas A&M University, 1979; Graduate Teaching Assistant, Dept. of Oceanography, Texas A&M University, 1979; Research Assistant, Dept. of Oceanography, Texas A&M University, 1978; Graduate Teaching Assistant, Dept. of Oceanography, Texas A&M University, 1978; Research Assistant, Dept. of Oceanography, Texas A&M University, 1977; Graduate School Fellow, Dept. of Oceanography, Texas A&M University, 1976-1977; Research Fellow, PRECOL, Dept. of Zoology and Physiology, Louisiana State University, 1975-1976; Teaching Assistant, Dept. of Zoology and Physiology, Louisiana State University, 1974-1975; Research Fellow, Petroleum Refineries' Environmental Council of Louisiana (PRECOL), Dept. of Zoology and Physiology, Louisiana State University, 1974.

Selected Publications:

Denoux, G.J., A study of the fine-scale patchiness of selected copepod species in the California Current,

Ph.D. Dissertation, Texas A&M University, College Station, TX, 1984.

Kennicutt, M.C., II, J.M. Brooks and G.J. Denoux, Carbon isotope, gas chromatography, and fluorescence techniques applied to the North Slope of Alaska correlation study, In: Alaska North Slope Oil-Rock Correlation Study: Analysis of North Slope Crude (Ed. by L.B. Magoon and G.E. Claypool), pp. 639-650, AAPG Studies in Geology Series #20, 1986.

Kennicutt, M.C., II, G.J. Denoux, J.M. Brooks and W.A. Sandberg, Hydrocarbons in Mississippi Fan and intraslope basin sediments, Geochim. Cosmochim. Acta, 51: 1457-1466, 1987.

Brooks, J.M., M.C. Kennicutt II, R.R. Bidigare, T.L. Wade, E. Powell, G.J. Denoux, R.R. Fay, J.J. Childress, C.R. Fisher, I. Rosman, and G.S. Boland, Chemosynthetic ecosystems, hydrates and oil seepage on the Gulf of Mexico slope: an update, EOS, 68(18): 498-499, 1987.

Kennicutt, M.C. II, J. M. Brooks, and G. J. Denoux, Leakage of deep, reservoired petroleum to nearsurface sediments in the Gulf of Mexico continental slope, Marine Chemistry, 24(1): 39-59, 1988.

Kennicutt, M.C. II, J. M. Brooks, R. R. Bidigare and G. J. Denoux, Gulf of Mexico Hydrocarbon Seep Communities: I. Regional Distribution of Hydrocarbon Seepage and Associated Fauna, Deep-Sea Research, 35: 1639-1651, 1988.

Brooks, J.M., M.C. Kennicutt II, T.L. Wade, A.D. Hart, G.J. Denoux and T. J. McDonald, Hydrocarbon distributions around a shallow water multiwell platform, Environmental Science & Technology, 24(7): 1079-1085, 1990.

Wade, T.L., J.M. Brooks, M.C. Kennicutt II, T.J. McD onald, G.J. Denoux, and T.J. Jackson, Oysters as biomonitors of oil in the ocean, In: Proceedings 23rd Annual Offshore Technology Conference, Houston, TX, pp. 275-280, May, 1991.

Kennicutt II, M.C., S.T. Sweet, T.J. McDonald, and G.J. Denoux, Oil spills in polar climates: The Bahia Paraiso accident, In: Proceedings 23rd Annual Offshore Technology Conference, Houston, TX, pp. 493-500, May, 1991.

Dr. Terry L. Wade Deputy Director, Environmental Sciences

Specialties: Environmental Chemistry Chemical Oceanography Methods Development Atmospheric Deposition Project Management Marine Organic Geochemistry

Education: B.A. (Chemistry), Hartwick College, 1971; M.S. 1974, Ph.D. 1978 (Chemical Oceanography), University of Rhode Island.

Professional Experience: Associate Director and Research Scientist, Geochemical and Environmental Research Group, Texas A&M University, 1992present; Associate Research Scientist, Geochemical and Environmental Research Group, Texas A&M University, 1986-1992; Member, Graduate Faculty, Texas A&M University, 1986-Present; Assistant Research Scientist, Dept. of Oceanography, Texas A&M University, 1984-1986; Adjunct Assistant Professor, Dept. of Oceanography, Old Dominion University, 1984-Present; NASA-ASEE Summer Faculty Fellowship Program, NASA Langley Research, 1982: Joint Appointment, Dept. of Chemical Science, Old Dominion University 1979-1986; Assistant Professor of Oceanography, Dept. of Oceanography, Old Dominion University, 1978-1984; Research Assistant and Graduate Student, Graduate School of Oceanography, University of Rhode Island, 1971-1978; National Science Foundation Summer Research Assistant, Hamilton College, 1970.

Selected Publications (>100 Publications):

Wade, T.L., B. Garcia-Romero, and J. M. Brooks. 1991. Oysters as biomonitors of butyltins in the Gulf of Mexico. Mar. Environ. Res., 32:233-241.

Wilson, E.A., E.N. Powell, T.L. Wade, R.J. Taylor, B.J. Presley, and J.M. Brooks. 1992. Spatial and temporal distributions of contaminant body burden and disease in Gulf of Mexico oyster populations: The role of local and large-scale climatic controls. Helgol,,nder Meeresunters, 46:201-235.

Kennicutt II, M.C., T.L. Wade, B.J. Presley, A.G. Requejo, J.M. Brooks, and G.J. Denoux. 1994. Sediment contamination in Casco Bay, Maine: Inventories, Sources, and Potential for Biological Impact. ES&T 28: 1-15.

Jackson, T.J., T.L. Wade, T.J. McDonald, D.L. Wilkinson, and J.M. Brooks. 1994. Polynuclear

Aromatic Hydrocarbon contaminants in oysters from the Gulf of Mexico (1986-1990). Environmental Pollution, 83: 291-298.

Wade, T.L., D.J. Velinsky, E. Reinharz, C.E. Schlekat. 1994. Tidal River Sediments in the Washington, DC Area II. Distribution and sources of organic contaminants. Estuaries 17: 321-333.

Sericano, J.L., S.H. Safe, T.L. Wade, and J.M. Brooks. 1994. Toxicological significance of non-, mono- and diortho-substituted polychlorinated biphenyls in oysters from Galveston and Tampa Bays. Environmental Toxicology and Chemistry 31: 1797-1803.

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Summers, J.K., T.L. Wade, V.D. Engle, and Z.A. Malaeb. 1996 Normalization of Elemental Concentrations of Contaminants in Estuarine Sediments of the Gulf of Mexico. Estuaries 19: 581-594.

Grace Ekman Quality Assurance/Quality Control Manager

Education: B.S., Chemistry, Johnson State College M.S., Organic Chemistry, University of Vermont Medical and scientific courses at Alverno College, MATC, WCTC

Current Position: 1994 to present: Quality Assurance/Quality Control Manager, Geochemical and Environmental Research Group, Texas A&M University, College Station, Texas. As Quality Assurance/Quality Control Manager for the Geochemical and Environmental Research Group at Texas A&M University, Ms. Ekman is responsible for promulgating, enacting, and enforcing QA procedures and policies at GERG. The QA Manager ensures that all GERG activities are operated in a manner that provides confidence that project and QA objectives are met. Ms. Ekman is independent of project management, and is responsible for ensuring applicable QC policies and directives provide products of high quality to both internal and external clients.

Selected Experience: Quality Assurance/Quality Control Manager, Law Environmental National Laboratories, Pensacola, Florida. Responsible for insuring that laboratory operations were consistent with good laboratory practices and in compliance with regulatory requirements. She served as technical and QA/QC liaison to clients and regulatory agencies, responding to questions regarding methodologies, data interpretation and analytical results. Responsible for development and maintenance of analytical and instrumental documentation, SOPs and QA Manuals and project plans. Responsible for QA/QC training, developed inhouse training documentation, completed analyst proficiency requirements, and initiated the use of control charts with associated statistical protocol. Maintained state certifications, in addition to managing various proficiency sample programs and internal/external audit activities.

Client Services Manager, CH2M Hill, Montgomery, Alabama. Responsible for overall implementation of client services and project management functions. Responsible for preparing proposals, reports, and technical papers as well as management of large-scale laboratory projects. Monitored workload capability of the laboratory, supervised client services, data package and sample custody activities, as well as serving as the interface between client and laboratory management. Represented laboratory services to prospective and current clients, provided technical support to the staff, and provided management support to the laboratory director. Involved in preparation of marketing plans for the laboratory.

Regional Quality Assurance Manager, National Environmental Testing, Thorofare, New Jersey. As QA/QC manager for a National Environmental Testing's Atlantic Region, assisted in the definition and implementation of national, regional, and divisional QA goals. Coordinated and supported QC officers at each laboratory and managed the preparation of uniform SOPs and QAPPs in accordance with various regulatory protocols. Assisted in the implementation of the firm's internal QA testing program and the internal/external audits, proficiency samples and associated corrective actions. Was responsible for the implementation of regional safety programs and safety training activities. In addition, was very active in modifications of job descriptions and in documentation of personnel training activities.

Organic Laboratory Manager/QC Supervisor, CHEM-BIOCorporation, Oak Creek, Wisconsin. Responsible for the management of all chemists in the GC/MS, GC, and extraction sections for a full service environmental laboratory. Duties included budgetary responsibility, personnel, and new equipment justification and procurement. Directed the analysis of PCB's, pesticides, herbicides, VOA, Semi-VOA, TPH, drug testing, and industrial hygiene samples in multi-media matrices

As laboratory manager, was responsible for heavy client contact. Answered technical questions; advised field and laboratory protocol, responsible for scheduling samples; and developing new procedures and methodologies. Very knowledgeable of EPA regulations and protocols, drinking water regulations and AIHA procedures.

Responsible for QA/QC for organic, drug testing, inorganic, and industrial hygiene samples analyzed by entire laboratory. Duties included QC data review and technical review and approval of the data packages. Additionally, responsible for QC documentation; use of control charts and statistical methods; adherence to existing methods; method development: SOP generation; internal and external lab audits; regulatory and client proficiency samples; and maintaining various state certifications.

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PERSONAL RESUME

DAVID P. JANKA P. O. Box 1231 Cordova, Alaska 99574 907-424-3420 h 907-424-3428 w <auklet@ptialaska.net>

- HIGHLIGHTS OF QUALIFICATIONS -

* Organized and resourceful, with a wide range of skills * * Capable and experienced with a record of reliability *

- RELEVANT SKILLS AND EXPERIENCE -

- Owner and operator of Auklet Charter Services, a Cordova based charter boat business specializing in Prince William Sound scientific research, film crew support and adventure cruises, emphasizing natural history, wildlife viewing, birding, photography, kayak drop-offs and support.
- Over 20 years Alaskan boating experience (see page 2 for details). U.S. Coast Guard licensed operator of uninspected passenger vessels upon inland waters since 1987.
- Involved with a variety of research projects requiring exact record keeping, meticulous observations and odd hours in sometimes difficult conditions. Other duties included vessel operations, computer usage, learning and adapting lab and field techniques, species identification and sampling procedures. Fields of study included glaciology, marine, lake and stream ecology, fisheries, water quality and pollution monitoring, and marine intertidal.
- Served as Executive Director of Prince William Sound Conservation Alliance, a private non-profit public advocacy and environmental education organization. Responsibilities included fund-raising, membership, office management, newsletter publication, grant writing, interaction with regulatory agencies, contact with the media, elected officials, and other environmental organizations. Other duties included responding to governmental and industry activities, representation at public hearings, conferences and meetings, building public awareness and assimilating the wide range of environmental issues affecting the Prince William Sound area.
- Coordinated the fall 1990 and participated in the summer 1990 and spring 1991 Valdez Local Response Program (a State funded program for local response to the Exxon Valdez oil spill). Duties included the hiring, training and outfitting of a crew for manual clean-up of oiled salmon stream sites in Prince William Sound. Worked with state, federal and industry personnel. Supervised and/or participated in field, vessel and office operations, shoreline surveys, and documentation.
- Helped build, coordinate and manage a remote camp and food facility at Growler Island, in Prince William Sound, 30 miles SW of Valdez. Was responsible for overnight guests, daily visitors, care of small boats, equipment and facilities. Supplied interpretative information and took overnight guests on day charters and hikes. Responsible for spring set-up, fall break-down and winter caretaking.
- Worked in most aspects of a production salmon hatchery.
- Camping, hiking, cross-country skiing, ocean kayaking and photography experience.
- Designed, engineered, and built a two-story 28' x 34' houseboat (1984-1986) in which my wife, Annette, and daughters, Holly and Brenna, and I live.

- RELEVANT SKILLS AND EXPERIENCE CONTINUED -

• Operated and/or crewed on a variety of vessels in Alaska including:

58' "Auklet". Extended trips supporting research, agency and filming projects in Prince William Sound, the southern Kenai peninsula, Kenai Fjords National Park and Shelikof Strait. Organizations worked with; Prince William Sound Science Center; Kinnetic Labs; National Biological Service; Hymet; PWS Regional Citizens Advisory Council; NMFS; USFS; NOAA; Bristol Environmental; Marine Research Specialists; USGS; ADEC; Universities of AK, CA, WA; ADF&G; U.S. Fish and Wildlife Service; North Gulf Oceanic; KTOO TV; Graphic Films; Tokai TV; and ABR.

40' "Growler". U. S. Geological Survey research vessel undertaking glacier research in Glacier Bay and Kenai Fjords National Parks, Prince William Sound, and SE Alaska. Work included the charting of newly formed fjords and documenting the advance and retreat of tidewater glaciers.

34' "Sea view", 36' "Coho II", 32' "Seaquel", and 30' "Greystone". Vessels working in Prince William Sound in response to the Exxon Valdez oil spill.

80' "Glacier Spirit". October-December 1987 Valdez-Cordova, four trips/week "ferry" run. 1986 Valdez-Anchorage run and shuttle of personnel and visitors from aircraft carrier anchored in Cook Inlet to the Port of Anchorage. Valdez-Columbia Glacier tours.

Research work, tourist cruises, supply runs, pleasure trips and fishing charters in Prince William Sound aboard the motor vessels; "Kyle David", "Doreen", "Tempest", "Denali", "Discovery", "Mary Helen", "Vince Peede", "Arctic Tramp", "Peggy's J", "Raider", "Kingfisher", "Seaquin" and "Suzy Q"; sailing vessels, "Arctic Tern II", "Arctic Tern III", and "Arctic Falcon", landing crafts; "Silver Eagle" and "Pacman" as well as many skiffs and kayaks.

In 1991 supplied local knowledge, interpretive information and guiding for David Rockefeller Jr's. 4-44' sailing vessel flotilla trip through Prince William Sound and on to Seward and Greenpeace's 140' motor/sailor "Rainbow Warrior's" trip from Anchorage to Valdez.

- EMPLOYMENT HISTORY -

March 1995-present	Owner/operator, Auklet Charter Services, P. O. Box 498 Cordova, Alaska 99574.	
1992-1995	Operator of the motor/vessel "Auklet" for Dean Rand of Discovery Voyages, P. O. Box 1500 Cordova, Alaska 99574.	
1991-1992	Executive Director, Prince William Sound Conservation Alliance, P. O. Box 1697 Valdez, Alaska 99686.	
1990-1991	Project Coordinator and Field Technician for the Valdez Local Response Program through Prince William Sound Conservation Alliance, Valdez.	
1989-1990	Relief skipper on vessels working Exxon's Prince William Sound operations.	
1986-1990	Camp manager and charter boat operator for Stan Stephen's Cruises, P. O. Box 1297, Valdez, Alaska 99686.	

- EMPLOYMENT HISTORY CONTINUED -

1985-1993	Owner/Photographer of Coastal Images, Valdez.
1986-1987	Cab and local tour bus driver for Valdez Yellow Cab, Valdez.
1979-1986	Non-credit instructor (banjo and photography) and theater set construction for Prince William Sound Community College, Valdez.
1980-1985	Fisheries Technician/Biologist for Valdez Fisheries Development Association, Solomon Gulch Hatchery, Valdez.
1976-1983	Research Assistant in Prince William Sound for National Marine Fisheries Service, Auke Bay, Alaska.
1979-1980	Research Assistant in Valdez for Rockwell International, Canoga Park, CA.
1978-1979	Research Assistant in Alaska for U.S. Geological Survey, Tacoma, WA.
1970-1978	Earlier Alaska, Wisconsin and Illinois Employment: Photography, Recreation, Restaurant/Bar, Inventory Control, Parts, Purchasing, Shipping and Receiving.

- EDUCATION AND TRAINING -

Prince William Sound Community College:

1997/1998	"24 Hour & 8 Hour Refresher HAZWOPER Technician"
1995	"Survival Equipment, Procedures and Onboard Drills"
1992	"Grant writing"
1990/1992	"CPR and First Aid"
1983	"Astronomy"
1981	"Sailing And Seamanship for Prince William Sound"
1980	"Marine Environment of Prince William Sound"

Cordova Fire Department:

1993, '94, '96, '98 CPR and First Aid Training.

Alaska Department of Environmental Conservation and/or Exxon: 1990/1991 HAZWOPER Training.

Valdez Fire Department:

1987-1992 CPR and First Aid Training.

Benet Academy High School, Lisle, Illinois 1972 Graduate.

6.0 ____REFERENCES_____

Program	Client	Contact
Point Woronzof NPDES Permit Monitoring Program (1986 - present)	Municipality of Anchorage, Anchorage Water and Wastewater Utility (AWWU)	Robert LeVar, Municipality of Anchorage AWWU, 325 East 94th Court, Anchorage, AK 99515-2111 907-267-4528
Cook Inlet Regional Citizens' Advisory Council Environmental Monitoring Programs (1995 - 1997)	Cook Inlet Regional Citizens' Advisory Council	Susan Saupe, Cook Inlet Regional Citizens' Advisory Council, 910 Highland Avenue, Kenai, AK 99611 907-283-7222
Professional Environmental Science Services (1990 - 1996), Prudhoe Bay Seawater Treatment Plant NPDES Monitoring	ARCO, Alaska Inc. and CH₂M Hill	Rod Hoffman or Caryn Rea ARCO Alaska, Inc. Prudhoe Operations, P.O. Box 100360, Anchorage, AK 99510-0360 907-659-5196
Subtidal Bark Accumulation Surveys of Log Transfer Facilities in Southcentral Alaska	Propes and Associates	Carl Propes, 3224 West 29th Avenue, Anchorage, AK 99517 907-265-4139

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Federal Register. 1986. Code of Federal Regulations, Title 40, Part 136, Protection of the Environment. (40 CFR 136). U.S. Government Printing Office, Washington, D.C.

- Janka, David. Auklet Charter Services. Personal communication with Janet Kennedy regarding potential sampling sites in Hinchinbrook Entrance area.
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Kinnetic Laboratories, Inc. 1993c. Initial survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 8 pp.

Kinnetic Laboratories, Inc. 1993d. Second survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 8 pp.

- Kinnetic Laboratories, Inc. 1994a. Annual monitoring report 1993. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 101 pp. and appendices.
- Kinnetic Laboratories, Inc. 1994b. Third survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 5 pp.
Kinnetic Laboratories, Inc. 1994c. Fourth survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 6 pp.

Kinnetic Laboratories, Inc. 1994d. Letter report on sampling at Alyeska Marine Terminal LTEMP Station in response to the T/V *Eastern Lion* oil spill. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 4 pp. and attachments.

Kinnetic Laboratories, Inc. 1995a. Annual monitoring report - 1994. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 151 pp. and appendices.

Kinnetic Laboratories, Inc. 1995b. Letter report on deep sediment sampling. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 5 pp. and appendix.

Kinnetic Laboratories, Inc. 1995c. Fifth survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 6 pp.

Kinnetic Laboratories, Inc. 1995d. Sixth survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 9 pp.

Kinnetic Laboratories, Inc. 1996a. Annual monitoring report - 1995. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 80 pp. and appendices. Kinnetic Laboratories, Inc. 1996b. Seventh survey report. Prepared for the Prince William Sound Regional Citizens'-Advisory Council Long-Term Environmental Monitoring Program. 6 pp.

Kinnetic Laboratories, Inc. 1996c. Eighth survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 8 pp.

Kinnetic Laboratories, Inc. 1997a. 1996 - 1997 monitoring report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 94 pp. and appendices.

Kinnetic Laboratories, Inc. 1997b. Ninth survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 9 pp.

Kinnetic Laboratories, Inc. 1997c. Tenth survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 6 pp.

Kinnetic Laboratories, Inc. 1997d. Letter report on the Ballast Water Treatment Plant spill at Alyeska Marine Terminal. Prepared for the Prince William Sound Regional Citizens' Advisory Council. 12 pp.

Kinnetic Laboratories, Inc. 1998a. 1997 - 1998 LTEMP monitoring report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 76 pp. and appendices.

Kinnetic Laboratories, Inc. 1998b. Eleventh survey report. Prepared for the Prince William Sound Regional Citizens' Advisory Council Long-Term Environmental Monitoring Program. 7 pp. National Oceanic and Atmospheric Administration. 1989. The National Status and Trends Program for Marine Environmental Quality. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Rockville, MD. 13 pp.

O'Clair, C.E. and S.T. Zimmerman. 1986. Biogeography and ecology of intertidal and shallow subtidal communities. *In:* D.W. Hood and S.T. Zimmerman, editors. The Gulf of Alaska, physical environment and biological resources. Published by the Alaska Office, Ocean Assessments Division, National Oceanic and Atmospheric Administration, U.S. Department of Commerce with financial support from the Alaska OCS Region Office, Minerals Management Service, U.S. Department of the Interior. pp. 305 - 344.

Payne, J.R., W.B. Driskell, and D.C. Lees. 1998. Long Term Environmental Monitoring Program data analysis of hydrocarbons in intertidal mussels and marine sediments, 1993 - 1996. Prepared by J.R. Payne Environmental for the Prince William Sound Regional Citizens' Advisory Council. 97 pp. and appendices.

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Alaska Whaling Wall for Prince William Sound

Restoration category: General restoration

Proposer: Econo Painting of Anchorage Alaska

Lead Trustee agency: Exxon Valdez Trustee Council

Coorperating Agencies: The Wyland Foundation of Hawaii

Alaska Sealife Center: no

Duration: 1st year, 1 year project

Cost FY 01: \$142,000

Cost FY 02: none

Geographic Area: Prince Willam Sound

Injured Resource: Killer Whales (A/B pod)

ABSTRACT

Enhance public awareness through illustration of the plight of the Prince William sound's killer whale A/B pod and use this opportunity to obtain one of history's last Wyland whale walls, while recommitting to a community that has had human services greatly affected/ A mural of recovery, a new song for remembrance and continued mind-set of the restoration of these magnificent mammals.

> APR 1 4 2000 EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

01549

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

T.	Authorized	Proposed	
Budget Category:	FY 2000	FY 2001	
Personnel	\$27.7	\$0.0	
Travel	\$26.0	\$0.0	
Contractual	\$37.7	\$0.0	
Commodities	\$27.7	\$0.0	
Equipment	\$14.3	\$0.0	LONG RANGE FUNDING REQUIREMENTS
Subtotal	\$133.4	\$0.0	Estimated
Indirect	\$8.5		FY 2002
Project Total	\$141.9	\$0.0	\$1.3
Full-time Equivalents (FTE)		0.0	
			Dollar amounts are shown in thousands of dollars.
Other Resources			
Indirect : Administrative overh NEPA compliance: 0% , Workshop attendence, report v	ead, limited to 6	% ons, professi	sional conferences and community involvment : 6%
FY01	Project Num Project Title Name: Ecor	ber: 0/ : Alaska W no Painting	549 Whaling Wall for Prince William Sound Ig SUMMARY
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2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET October 1, 2000 - September 30, 2001

Pers	sonnel Costs:				Months	Monthly		Proposed
	Name	Position Description			Budgeted	Costs	Overtime	FY 2001
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								0.0
								0.0
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			Subtotal		0.0	0.0	0.0	
						Per	sonnel Total	\$0.0
Trav	vel Costs:			Ticket	Round	Total	Daily	Proposed
	Description			Price	Trips	Days	Per Diem	FY 2001
								0.0
								0.0
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	FY01	Drajoot Title: Alaska	Albalian Mal	lifor Drings			F	ersonnel
		Project Title: Alaska	whating wat	nor Prince	vvillam 500	nu		& Travel
		Name: Econo Paintin	g					DETAIL
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Prepared:

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET

October 1, 2000 - September 30, 2001

Contractual Costs:	Proposed
Description	FY 2001
Contractual Tota	\$0.0
Commodities Costs:	Proposed
Description	FY 2001
Commodities Total	\$0.0
FY01 Project Number: FCo Project Title: Alaska Whaling Wall for Prince William Sound Co Prepared: Name: Econo Painting	ORM 4B ntractual & mmodities DETAIL

2001 EXXON VALDEZ TRUSTEE COUNCIL PROJECT BUDGET October 1, 2000 - September 30, 2001

Description of Units Price F Image: Description Image: Description Image: Description Image: Description Image: Description Image: Descri	New Equipment Purchases:		Number	Unit	Proposed
Those purchases associated with replacement equipment should be indicated by placement of an R. New Equipment Total Existing Equipment Usage: Description Of Units Existing Equipment Usage: Description	Description		of Units	Price	FY 2001
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Existing Equipment Usage: Number Description of Units	Those purchases associated with	replacement equipment should be indicated by placement of an R.	New Equ	ipment Total	\$0.0
Description of Units	Existing Equipment Usage:			Number	
	Description			of Units	
FORM					
FY01 Project Number: Project Title: Alaska Whaling Wall for Prince William Sound Name: Econo Painting	FY01	Project Number: Project Title: Alaska Whaling Wall for Prince William Sou Name: Econo Painting	nd	F	FORM 4B Equipment DETAIL

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A checklist and distributional analysis of marine algal species collected as vouchers during the CHIA-EVOS studies. (submitted under BAA)

Project Number:	OISSI-BAA
Restoration Category:	Research and publication preparation
Proposer:	Gayle I. Hansen (Oregon State University, HMSC)
Lead Trustee Agency:	
Cooperating Agencies:	
Alaska SeaLife Center:	No
Duration:	1 st year of a 1-year project
Cost FY 01:	\$65,734
Geographic Area:	No field work will be carried out, but specimens from the entire oil spill area will be utilized for the study.
Injured Resource/Service	Intertidal communities: macrobenthic marine algae or seaweeds

ABSTRACT

During the CHIA-EVOS studies, intense investigations were carried out on the intertidal algal communities of Prince William Sound, Kenai, Kodiak, and the Alaska Peninsula. As a byproduct of these studies, thorough voucher collections were made of the algal species present in more than 100 transect areas used for the study. The 7,300 voucher specimens were identified to species, curated, and cataloged, but no money was available at the time for publishing the wealth of information on algal biodiversity and distribution they provided. For this study, we will use these data to prepare regional checklists and biogeographic analyses of the species discovered and finally make available these critical habitat data for restoration and conservation efforts in Alaska.



Project

INTRODUCTION

Macrobenthic marine algae or seaweeds form the base of the food chain in nearly all rocky intertidal and shallow subtidal communities. In areas where they flourish, they also benefit both the structural and chemical environment. Near-shore marine animals are all at least partially dependent on algae for survival, and the environmental stresses that impact the algae also impact these members of the higher trophic levels.

Even so, comparatively few environmental impact studies have been done on the macrobenthic marine algae. One reason for this appears to be that many of these plants are difficult to identify. They often require sectioning and microscopic examination for species determination, a time-consuming procedure prohibitive in most studies. Therefore, when algal investigations are done, identifications are often limited to genera and/or complexes that can be easily identified in the field, a short-cut that frequently leads to problems in data interpretation. In Alaska, other factors compound the difficulties. There are no illustrated keys to the marine algae of this region. During the CHIA studies, we were able to use two somewhat helpful identification guides: (1) the unillustrated keys of Gabrielson *et al.* (1989) covering the algae from Oregon to southeast Alaska and (2) the illustrated but out-of-date flora of Abbott and Hollenberg (1976) on the *Marine Algae of California*. These guides were useful, but they only covered a portion of the algae in the oil spill area. Therefore numerous individual taxonomic papers on the algae of other areas (Japan, Russia, Eastern Canada, Europe) had to be used to adequately cover the species encountered, and species identifications had to be made primarily by experts.

There have been a number of floristic studies that have included marine algae from Alaska, but most of these have been historical. In 1840, Postels and Ruprecht published a richly illustrated text on the algae collected during the 1826-29 Luetke expedition from Russia to southeastern Alaska. Later, Saunders (1901) described and illustrated many of the species encountered during the Harriman Alaska Expedition. Perhaps the most comprehensive of these early accounts were those of Setchell and Gardner who included many Alaskan species in their monumental books on the marine algae of the Pacific Coast of North America (1903, 1919-1925). The most important recent account of the marine algae of Alaska was by Lindstrom (1977). It was the first complete checklist of the marine algae of the entire state. This checklist, compiled primarily from the literature, was used as a baseline for Alaskan marine algal studies for many years. Calvin and Lindstrom went on to produce checklists of the algae of Berner's Bay (1977), Port Valdez (1980), and Juneau (1986), and a number of environmental impact studies have relied on these lists as starting points for their investigations. Perhaps the best known of these are the RCACfunded studies of Port Valdez by Weigers et al. (1997) and Hines et al. (1999). Most recently, O'Clair and Lindstrom (2000) have produced an illustrated account of southeastern Alaska's algae entitled North Pacific Seaweeds. This volume will be of great value to all algal researchers working in that area.

During the EVOS investigations in Alaska, the importance of macrobenthic marine algae was finally recognized. Numerous researchers took part in algal studies that were well-funded by both EXXON and the Trustees. Volumes of data resulted from these studies, but little of this information has been made readily available to the public. Although there were numerous technical reports produced, few peer-reviewed articles or books have appeared on the data. Most of it remains on government or university shelves waiting for the opportune moment for publication. Many years have gone by since the spill, and it has become more and more imperative that this information is published now before it is forgotten.

Prepared 04/12/2000

Project

NEED FOR THE PROJECT

A -- Statement of Problem.

During the EVOS studies by the University of Alaska, support was generously provided for the CHIA studies, but, due to its litigation sensitivity, no support was given for publishing the data. This left a huge amount of information unavailable to the scientific community and to the public. This proposal is for financial support for the preparation and publication of a peer-reviewed journal article on the occurrence and distribution of marine macroalgae in the oil spill area based on data derived from the CHIA algal voucher collection. In addition, it will provide the funding necessary to correct and update the taxonomy and nomenclature used for these specimens and their corresponding database, thus vastly improving the usefulness of this resource for environmental studies in Alaska.

Because so little was known about the marine algae of south-central Alaska during the EVOS studies, the CHIA algal teams (including the proposed PI) carefully collected and pressed voucher specimens for later identification from more than 100 sites visited during the study. At each site, at least one of every species present was collected, amounting eventually to many thousands of specimens. These were then sent to the proposed PI in Newport, Oregon, where they were identified, curated, cataloged and labeled. With the help of 2 part-time assistants and many volunteers, she was able to finish the entire collection by the 1994 deadline, but then the funding ended. There was no support for editing the database or for publishing the results. Now, before this wealth of information on the occurrence and distribution of marine algae in Alaska is lost, it is important to revive and edit the data and analyze the results for publication in a peer-reviewed journal that will be available to all that are interested.

B -- Rational/Link to Restoration.

The proposed paper will provide information on the algal biodiversity occurring in each of the areas studied by the CHIA teams. Without knowledge of the diversity of species present in an area, it is often difficult to accurately assess environmental impacts such as those encountered during the CHIA studies. Part of the problem appears to be that interactions between species frequently occur. For example, the death of one species might cause the death of another -- or allow it to flourish through a lack of competition. Algal species also vary greatly in their ability to withstand exposure to oil, hot water washes, and trampling. Damage to one species will not necessarily reflect damage to others. Some species (e.g., annuals like *Ulva fenestrata*) rebound quickly from perturbation while others (e.g., perennials like *Fucus gardneri*) may take several years to recover. Much of this variation in response is influenced by the life history and method of growth of the individual species and by their vegetative and reproductive seasonality, fecundity, and ability to disperse and recruit. If restoration procedures are used to expedite recovery of any algal species, it is imperative that these features and the environmental factors that trigger them are well understood--not just for the restored species but for all of those species impacting its fate. Otherwise time and money may be wasted.

C -- Location.

The project will be carried out at the CHIA collection herbaria located at JCSFOS in Auke Bay (AK) and at the Hatfield Marine Science Center in Newport (OR). One study trip will be made to the herbarium of the University of California at Berkeley to examine Alaskan type material, use the library, and discuss problematic species with the experts there. The project will include all 7,300 specimens collected as site vouchers by the CHIA algal teams. The resulting paper will be an essential resource for scientists monitoring and restoring the oil spill area. It will provide valuable information for marine biologists, teachers, and environmental managers working in Alaska, and it will be useful to those in the general public that use algae for food.

COMMUNITY INVOLVEMENT AND TRADITIONAL KNOWLEDGE

Since this project involves mainly laboratory (herbarium) work, literature research, and writing, there will be no community involvement. However, the final paper will be of interest to native groups harvesting algae and/or herring roe-on-algae for food. To facilitate this more general use of the publication, common names will be included with the scientific names in this paper whenever possible.

PROJECT DESIGN

A -- Objectives.

The proposed publication will provide: checklists of the marine algae found in the Prince William Sound, Kenai Peninsula, and Kodiak/Cook Inlet regions studied by the CHIA teams. In addition, it will provide an analysis of the species distributions as they relate to geographic area, substratum type, wave exposure, and salinity and, when the data are available, to oil exposure and beach cleaning.

B -- Methods.

The project will involve the following stages of preparation: a preliminary library and herbarium study of the difficult species, corrections and additions to the voucher database, voucher specimen annotations, checklist preparation, data analyses, and manuscript preparation.

Preliminary library and herbarium study of the difficult species. Although I am familiar with most of the Alaskan algal species and the type specimens that represent them, there are a number of species complexes that I find particularly confusing. These will need to be researched at the University of California at Berkeley herbarium which houses the most complete set of Alaskan type specimens and the most complete algal library within the United States. Some of the more difficult complexes include species in the genera *Alaria, Mazzaella, Mastocarpus, Porphyra, Ceramium, Neorhodomela,* and *Polysiphonia*. Within the past 5 years, monographs have been written on several of these making identifications much easier. On others, I have projects in progress that will assist me in my final determinations. Some nomenclatural problems exist with the species, but by the summer of 2001 these should be resolved through discussions with S. Lindstrom for our NSF project on the *Marine Flora of Alaska*. The complexes that cannot be

resolved during the time-frame allowed will remain listed as species or generic complexes in the paper. During the EVOS studies, I did discover several new species. These will not be included in this paper, but it is hoped that the Trustee Council or GEM project will support the descriptive work necessary to describe these species by 2002.

- 2. Voucher database corrections and additions. The voucher database was designed and programmed by myself and a volunteer during the early CHIA studies in order to mainly produce specimen labels. It was initially written (from scratch!) in BASIC, and it was a wonderfully useful program. But, after entering the first few thousand specimens, I soon realized that the sorting procedure was way too slow. Therefore, I transferred the data into Fox Pro II, a program that my lab used for data entry until the close of the project in 1994. Recently, I imported the data into Access 2000, a database that is much easier to work with and that I have become an expert in during the past few years. Over the EVOS study years, a number of people in my lab were involved in data entry of the voucher specimens and numerous typographic errors were made. Before queries and analyses even begin to be possible, it is imperative that corrections are made. I will spend at least one month at this task and at incorporating the taxonomic and nomenclatural decisions described in #1 into the database. In addition, the known information on habitat types will be entered.
- 3. <u>Voucher collection annotation</u>. Except for a small reference set of specimens held my me in Newport, the CHIA voucher collection is currently held entirely at the herbarium in Juneau. It is a valuable resource for those studying algae in Alaska and only recently was examined by R. O'Clair for her book with S. Lindstrom on *North Pacific Seaweeds*. Since it is in active use, it is important that I go through the specimens to cross-check my earlier identifications and annotate the specimens for taxonomic and nomenclatural changes and for typographic mistakes. Since the data for these changes will be maintained in my Access database, it will be an easy matter to query the database for these changes and to generate Annotation Labels for all of the specimens. However, it will be a time-consuming task to attach these labels to all of the specimens concerned so that others will be aware of the changes. Therefore, in order to stick within the time-frame established for the project, an assistant will be employed to help with this task.
- 4. <u>Checklist preparation</u>. I will query the database for lists of species from the entire spill area and then from each of the geographic areas. As in our first preliminary CHIA project report (1991), I will indicate which species were new records to the area at the time of the study.
- 5. <u>Data analyses</u>. This will be performed with the assistance of M. Stekoll, my coauthor. Although we are still in the process of determining which analyses to use, some of the species group characteristics and preferences that we will try to reveal are:
 - i. widespread vs. narrow distributions.
 - ii. substratum preference (bedrock, boulder or cobble).
 - iii. exposure preference (exposed or sheltered, and aspect).
 - iv. low salinity tolerance (if salinity data is available)
 - v. oil exposure and cleanup tolerance and/or quick recovery.

Most of these preference or similarity groups can be determined through simple queries. If more elaborate analyses are used, they will be determined and performed by M. Stekoll. After obtaining our results, we will overlay the biological features of the species, particularly those that relate to taxonomy and life history. The influence of these genetic features on the group preferences will be discussed.

6. <u>Manuscript preparation</u>. I will prepare the first draft of the manuscript in MS Word. Stekoll will prepare the graphics in MS Excel or another program and edit the

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manuscript. I will be responsible for the final submission to *Botanica Marina* and for the final report.

C -- Cooperating Agencies, Contracts, and Other Agency Assistance. None at this time.

SCHEDULE

A-- Measurable Project Tasks for FY 01 (October 1,2000 - September 30, 2001)

(By) January 1, 2001:

- 1. Correct typographic errors and update nomenclature of the voucher specimen database as much as possible in Newport.
- 2. Visit Berkeley for 2 weeks to work on nomenclatural problems and examine type specimens -- further update the database.

(By) April 1, 2001:

- 3. Complete an abstract and/or poster or talk on the project for the Annual Restoration Workshop.
- 4. Attend the Workshop in Anchorage.
- 5. Visit Juneau for 9 days to check the taxonomy of the voucher specimens, distribute and glue the annotation labels, and correct the database. Borrow particularly difficult specimens.

(By) July 1, 2001:

- 6. Complete checklists and begin work on the analyses, graphics and manuscript.
- 7. Visit Juneau for another 9 days to make final corrections to the specimens and database, do the analyses.

8. Attend the Phycological Society of America meeting; give talk on the project. (By) September 30, 2001:

9. Complete the manuscript and submit it to a peer-reviewed journal.

10. Prepare and submit the final report.

B-- Project Milestones and Endpoints

July 1, 2001:	Completion of collection annotations and database corrections.
	Completion of analyses.
Sept. 30, 2001:	Completion and submission of manuscript.

Completion Date: September 30, 2001

PUBLICATIONS AND REPORTS

Hansen, G. I., and M. S. Stekoll. "A checklist and distributional analysis of marine algal species collected as vouchers during the CHIA-Exxon Valdez oil spill studies". We will submit our manuscript during the summer of 2001 to *Botanica Marina*, a journal that frequently includes biogeographic studies of this type.

PROFESSIONAL CONFERENCES.

Phycological Society of America, Estes Park, Colorado. June 2001. "A distributional analysis of marine algal species collected by the University of Alaska during the Exxon Valdez oil spill studies in south-central Alaska".

COORDINATION AND INTEGRATION OF RESTORATION EFFORT.

The data published in this report will most directly assist the "Ecosystem Synthesis/GEM Transition" projects and should be considered a part of the ecosystem characterization of the entire EVOS area. In addition to providing an analysis of the habitat types used for damage assessment, the report will also provide vital base-line data for the future Gulf Ecosystem Monitoring program.

Currently, G. Hansen has projects on Alaskan marine algae and/or ecosystem characterization in progress or recently completed with the following people:

- 1 Sandra C. Lindstrom (Hansen & Lindstrom, "A Flora of the Benthic Marine Algae of Alaska". NSF supported & currently in progress. Two months of salary remain on this project for Hansen during the 2000-2001 academic year. However, the actual completion of this project will not occur until the Fall of 2001, after the proposed study is submitted.) Please see the comment below.
- 2 Kathy A. Miller (Miller & Hansen, "A checklist of the marine algae of the Kenai Fjords National Park" -- currently on hold since unsupported).
- 3 Jane Middleton (I identified the many of the collections of Middleton and Dudiak used in their ADF&G oil spill reports and later by Bridget Callahan in her Checklist of the Marine Algae of Kachemak Bay. Middleton & Hansen are planning "A Guide to the Algae of Kachemak Bay" which is yet unsupported)
- 4 **Tom Suchanek and Gail Irvine** ("Characterization of habitat types present along the Shelikof Strait" -- I participated in the algal checklists and percent cover studies of this NPS funded project. The report is completed but not yet published)
- 5 Tuck Hines, Greg Ruiz, John Chapman, Nora Foster, Howard Feder, and James Carlton ("Biological Invasions of Cold-Water Ecosystems: Ballast-Mediated Introductions in Port Valdez/Prince William Sound, Alaska" -- I did the marine plant sections of this report, RCAC/Sea Grant funded and just completed.)

The data provided by the proposed project will assist in the completion of studies # 1, 2, and 3 and add insight to follow-up studies on # 4 and 5. It is particularly important that the proposed project be completed before #1 and 2 above so that credit for the CHIA collections can be given to the appropriate people and funding agencies.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS. Not applicable..

PROPOSED PRINCIPAL INVESTIGATOR:

Gayle I. Hansen Hatfield Marine Science Center Oregon State University 2030 S. Marine Science Drive Newport, Oregon 97365 USA Phone: 541-867-0200 Fax: 541-867-0138 E-mail: <u>Gayle.Hansen@hmsc.orst.edu</u>

PRINCIPAL INVESTIGATOR QUALIFICATIONS

Gayle I. Hansen is a Marine Algal Taxonomist, Ph. D.(1976), specializing in the Alaskan and Oregon floras (see the attached CV). She is probably best known for her part in the British Columbia Marine Algal Flora series (1981, 1983) and for her *Checklist and Biogeographic Analysis of the Marine Algae of Oregon* (1997). As algal taxonomist for the CHIA project, she contributed to the design of the intertidal algal studies and trained the algal technicians (many whom had been her students) in appropriate algal identification and sampling methods. During the CHIA study, Hansen and the technicians collected and pressed the entire site voucher collection. Each year's collection was sent to Oregon where she identified the specimens with the aid of a compound microscope and the appropriate literature. In a volunteer effort, Hansen and a computer specialist designed and programmed the initial voucher database. When funding became available, 2 part-time assistants joined her to curate, label, and catalog the entire collection by the 1994 deadline. The CHIA Algal Voucher Collection is now kept by the University of Alaska in Juneau except for one reference set of specimens that is permanently left with Dr. Hansen. The database (still in need of proofing and updating) is kept in Oregon with a copy in Juneau for use with the specimens.

Responsibilities: Correcting the taxonomy and nomenclature of the CHIA-EVOS algal voucher-specimen collection and annotating the sheets; correcting the database and adding habitat information; preparing the regional checklists; working with Stekoll on the biogeographic analyses and graphics, and writing and submitting the final manuscript for publication.

OTHER KEY PERSONNEL

 -- Michael S. Stekoll, Ph. D. (Professor of Biology, UAS and SFOS/UAF) Juneau Center for the School of Fisheries and Ocean Sciences University of Alaska Southeast 11120 Glacier Highway Juneau, Alaska 99801 Phone: 907-465-6279 Fax: 907-465-6447 E-mail: <u>ffmss@uaf.edu</u>

Responsibilities: Dr. Stekoll will coauthor the paper and will be responsible primarily for helping with the biogeographic analyses, graphics preparation, and manuscript editing. Dr. Stekoll served as PI for the EVOS-CHIA algal studies as well as for the Herring Bay experimental and monitoring studies. Without his impetus and support, the CHIA algal voucher collections would never have been made.

- 2. -- A student worker from either UAJ or OSU. Responsibilities: Help with attaching annotation labels to each of the 7,300 voucher specimens.
- 3. -- EVOS/CHIA field personnel.

Many of the CHIA algal technicians made heroic efforts to help us with our original collections. These included: Mandy Lindeberg, Robin Jenne, Brenda Konar, C. J. Rey, and Nancy Douglas. Larry Deysher, head of the CIK algal project was also extremely helpful. These and others will be acknowledged for their contributions in our paper.

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MAJOR INTERESTS:

Research and teaching in phycology, non-vascular plants, aquaculture, and conservation biology; research and consulting work on algal taxonomy, biogeography, and ecology; bibliographic and floristics database development; electronic publishing.

SPECIFIC INTERESTS:

Systematics and phylogeny of algae, alpha taxonomy, biogeography and floristics, biodiversity and conservation of marine algae, introduced species, harmful algal blooms, algal morphology, life histories of marine algae, culture techniques, edible and pharmaceutically important algae, algal harvesting techniques, marine and fresh-water fungi, diseases of marine algae, history of marine biology.

PERSONAL:

Place of birth: Arlington, Virginia, USA

Citizenship: USA

PRESENT POSITION: Associate Professor (Senior Research), Oregon State University at the Hatfield Marine Science Ctr. in Newport, Oregon

EDUCATION:

Ph.D. Botany, January 1976, University of North Carolina, Chapel Hill, N. C.

Dissertation title: The Morphology and Life History of *Cirrulicarpus carolinensis* sp. nov. (Kallymeniaceae, Cryptonemiales). (With: Prof. Max Hommersand)

M.S. Botany, September 1968, University of Vermont, Burlington, Vt. Thesis title: Yeasts from Lake Champlain: Their Occurrence and Physiology. (With: Profs. Kenneth Fisher and Donald Johnstone)

(With: Profs. Kenneth Fisher and Donald Johnstone)

A.B. Botany, June 1966, University of Connecticut, Storrs, Ct.

GRANTS AND AWARDS:

Hansen, G. I., and S. C. Lindstrom. Fall 1998-Fall 2001. A Flora of the Benthic Marine Algae of Alaska: Phase 1, An Inventory of the Existing Collections. NSF Biotic Surveys and Inventories.

Hansen, G. I. 1998-2000. Oregon's Impoverished Marine Flora: Targeting Areas for Conservation. OSU Research Council, Oregon Sea Urchin Commission, and Oregon Dept. of Fish and Wildlife.

Coenan, C. and G. Hansen. Summer 1991 - Holt Marine Education Fellowship. Preparing a visitor's pamphlet on algae for the park at Cape Perpetua

Hansen, G. I. Summer 1985 to Summer 1986 - Eloise Gerry Fellow of Graduate Women in Science.

Hansen, G. I. Spring 1976 to Summer 1977 - W. G. Farlow Fellowship, Harvard University, for research on red algae..

Hansen, G. I. Summer 1974 - Coker Fellowship, University of North Carolina, for Ph. D. research.

MEMBERSHIPS:

Phycological Soc. of America, International Phycological Soc., European Phycological Soc., Western Soc. of Naturalists. **E-mail Lists:** Algae-L, PSA, Taxacom, Phycotoxins, Marbio.

DATABASES AND MAJOR HERBARIUM COLLECTIONS PREPARED:

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- Hansen, G. I. 1999. A biogeographic study of the seaweeds of Port Valdez, Alaska. 14th International Botanical Congress and the Phycological Society of America Meetings, 1-7 Aug. 1999, St. Louis, MO. [Poster]
- Lindstrom, S. C., and G. I. Hansen. 1999. *A Flora of the Benthic Marine Algae of Alaska*, status and future prospects. 14th International Botanical Congress and the Phycological Society of America Meetings, 1-7 Aug. 1999, St. Louis, MO. [Poster]
- Hansen, G. I., & S. C. Lindstrom. 1999. The Benthic Marine Algae of Alaska: a preliminary report on the inventory of existing collections. 14th International Botanical Congress and the Phycological Society of America Meetings, 1-7 Aug. 1999, St. Louis, MO. [Poster]
- Choi, H.-G., T. O. Cho, G. W. Saunders, G. I. Hansen, and S. M. Boo. 1999. Phylogenetic relationships among selected Ceramieae (Rhodophyta) based on nuclear SSU rDNA sequences. 14th International Botanical Congress and the Phycological Society of America Meetings, 1-7 Aug. 1999, St. Louis, MO. [Poster]
- Hansen, G. I., and S. C. Lindstrom. 1999. *The Benthic Marine Algae of Alaska*: a preliminary report on the inventory of existing collections. The 13th Northwest Algal Symposium, 14-16 May 1999, Yachats, OR. [Poster]
- Hansen, G. I., and S. C. Linstrom. 1999. The Benthic Marine Algae of Alaska: the metadata structure for the inventory of existing collections. NBII/USGS and NSF Biological Informatics Activities, 16-17 March 1999, Denver, CO. [Talk]
- Hansen, G. 1999. Cryptogenic seaweeds, seagrasses, and marine lichens in Port Valdez, Alaska: who are they and how did they get there? First National Conference on Marine Bioinvasions, 24-27 Jan. 1999. Cambridge, MA. [Talk]
- Hansen, G. I. 1997. Botanical Beach and the early history of phycology in the Pacific northwest. 11th Northwest Algal Symposium, 9 May 1997, Victoria, BC. [Plenary address]
- Hansen, G. I. 1995 & 1996. The Oregon seaweed flora: depauperate or just understudied. (The Conservation and Management of Oregon's Native Flora, 15-17 Oct 1995, Corvallis, OR, and Western Society of Naturalists, 4-7 January 1996, Port Townsend, WA. [Talk]
- Hansen, G. I. and T. F. Mumford. 1994. Current (1994) regulations for the commercial, personal, and scientific collection of seaweeds on the West Coast of North America. Western Soc. Naturalists Meetings, 26-30 Dec 1994, Monterey, CA. [Talk]
- Hansen, G. I., T. F. Mumford, and E. Gilman. 1994. Current status of seaweed harvesting and management on the west coast of North America. 8th NW Algal Symposium, Humboldt State University, Arcata, CA. [Plenary address]
- Hansen, G. I. 1989. In memoriam: Maurice A. Dube (1927-1989). (4th NW Algal Symposium, Walla Walla College Marine Station, Anacortes), and the Phycological Newsletter 25 (2): 4-5.

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- -----. 1989. Nori farming in Anacortes, Washington: a political dilemma. 4th NW Algal Symposium, Walla Walla College Marine Station and the XIIIth International Seaweed Symposium, Vancouver. [Poster]
- -----. 1987-1988. Numerous letters to the editor of the Anacortes American on the positive aspects of aquaculture.
- -----. 1986. A preliminary study of a new genus in the Cystocloniaceae (Rhodophyta) from British Columbia. West. Soc. Nat. Meetings, Univ. Hawaii, Hilo. [Talk]
- -----.1986. Meeting Reports -- The Second Northwest Algal Symposium. Phycological Newsletter 22 (2): 8.
- -----. 1986. A re-evaluation of *Callophyllis cristata* (Kallymeniaceae, Rhodophyta). Western Soc. Naturalists Meetings, Monterey, and the 2nd NW Algal Symposium, Bamfield Marine Station. [Talk]
- -----. 1986. R. F. SCAGEL, a dedication. (2nd Northwest Algal Symposium, Bamfield Marine Station).
- -----. 1985. Meeting Reports -- The First Northwest Algal Symposium. Phycological Newsletter 21 (1): 5. -----. 1984. A newly discovered host of *Smithora naiadum* (Bangiophyceae, Rhodophyta). 1st
 - Northwest Algal Symposium, Friday Harbor, WA. [Talk].

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- Hansen, Gayle I., and Sandra C. Lindstrom. 1983. A morphological study of *Hommersandia maximicarpa* gen. *et* sp. nov. (Kallymeniaceae, Rhodophyta) in the North Pacific. Western Soc. Nat. Meetings, Simon Fraser University, BC.
- Hansen, Gayle I., and Robert F. Scagel. 1980. The reproductive morphology of *Opuntiella californica* (Solieriaceae, Rhodophyta). J. Phycol. 16, Supp.: 17. Botany 80, Vancouver, BC. [Talk]
- Hansen, Gayle I., and Robert T. Wilce. 1980. The morphology and taxonomy of *Kallymenia schmitzii* DeToni (Cryptonemiales) from the Arctic. J. Phycol. 16, Supp.: 17. Botany 80, Vancouver, BC. [Talk]
- Garbary, D., G. Hansen, and R. Scagel. 1979. A revised classification of the Bangiophyceae. Presented by DG at the Can. Bot. Assoc. meetings 1979.

Hansen, Gayle I. 1977. *Rhodophyllis dichotoma* (Lepechin) Gobi from New England. J. Phycol. 13, Supp.: 26. International Seaweed Symposium, Santa Barbara, CA.. [Talk]

- -----. 1977. The vegetative and reproductive morphology of *Rhodophyllis dichotoma* (Lepechin) Gobi (Gigartinales) from New England. Northeast Algal Symposium Abstracts. Northeast Algal Symposium, Woods Hole, MA. [Talk]
- -----. 1976. An unusual life history in *Cirrulicarpus* (Kallymeniaceae). J. Phycol. 12, Supp.: 26. American Institute of Biological Sciences meeting. [Talk]
- -----. 1974. A morphological and life history study of a new species of *Cirrulicarpus* (Kallymeniaceae, Rhodophyta) from North Carolina. J. Phycol. 10, Supp.: 4. American Institute of Biological Sciences meeting. [Talk]

RESEARCH AND CONSULTING EXPERIENCE:

- Sept. 1989--present. Research Associate Professor, Dept. of Botany and Plant Pathology, Hatfield Marine Science Center of Oregon State University: biodiversity database development, herbarium curation, research on the Oregon and Alaskan seaweed floras, harmful microalgal blooms, and the history of marine biology.
- 1997--present. Algal collections for faculty at numerous universities including: Montana Tech. (MT), SUNY at Binghamton (NY), St. Anselm's College (NH), Queens University (Ireland), University of North Carolina (NC), Univ. of British Columbia (Canada), Univ. of SW Louisiana (LA), and the University of Guelph (Canada).
- Jan. 1996--1997. Phycological consultant to Big Island Abalone, an aquaculture company growing *Haliotus* spp. in co-culture with *Palmaria mollis* at the NELHA facility in Kona, Hawaii. Cultivating *Palmaria* in unialgal cultures, writing import permits for algae, giving advice on mass cultivation of red algae, etc. [Contract]
- Dec. 1993--March 1994. Visiting Scientist, CSIRO Marine Laboratories, Hobart, Tasmania, Australia. Learning the Australian marine algal flora. [Service]
- Sept. 1989--Nov. 1993. Research Associate, University of Alaska in residence at the Hatfield Marine Science Center of Oregon State University - Algal Taxonomist for the State of Alaska damage assessment studies of the 1989 EXXON Valdez Oil Spill: collecting, identifying and processing the algal voucher collection; developing and analyzing the voucher database; training the field crew in voucher collection techniques and algal identification; helping to create and/or refine the experimental design whenever possible. (Note: This is the State litigation study of intertidal damage.)

- Summer 1992, 1993, 1994. Katmai National Park and the Kodiak Islands, Alaska. Algal Taxonomist for rocky intertidal studies (% cover and beach surveys) conducted along the Shelikov Strait by the Univ. California at Davis. [Contract]
- Jan. 1993--June 1993. Newport, OR. Scientific Advisor to the Kelp Harvest Committee of Oregon's Division of State Lands. Drafting regulations for the harvest of bull kelp, Nereocystis luetkeana, in Oregon coastal waters. [Service]
- March 1992--March 1993. Newport, OR. Member, Rocky Shores Advisory Council to the Oregon Ocean Policy Committee. Drafting policies for the Oregon state legislature on resource management of rocky intertidal areas.
- Spring 1992. Newport, OR. Yaquina Head Outstanding Natural Area, BLM, U. S. Dept. Interior. Identification of marine algal specimens from Yaquina Head, Oregon, and editing a brochure on marine algae. [Contract]
- Spring and Summer 1990. Homer, Alaska. Identification of Alaskan marine algal specimens collected for oil-spill monitoring projects for Alaska Fish and Game. [Contract]
- Summer 1989. Florida Keys. Identification of marine algae for fish herbivory studies in the Florida Keys by Prof. T. Koslow of Dalhousie University. [Service]
- Fall 1988. Anacortes, WA. Preparation of a large collection of frozen identified marine algae for pharmaceutical study by Prof. W. Gerwick of Oregon State University. [Service]
- January--June 1988. Anacortes, WA. Collecting and identifying marine algae, Carolina Biological Supply Co. [Contract]
- August--November 1987. Anacortes, WA.. Selecting, collecting, and identifying species of temperate marine algae for screening for natural products that inhibit the growth of cancerous cells for the National Cancer Institute [Contract]
- May 1985--Nov. 1987. Research Associate, Bamfield Marine Station, Bamfield, British Columbia: research on the morphology and systematics of new species of marine red algae occurring in the northeast Pacific.
- Sept. 1983--1989. Research Associate, Western Washington University in residence at the Friday Harbor Laboratories, the Bamfield Marine Station, or the Shannon Point Marine Ctr.: research on reproductive development in marine red algae and on the history of marine biology. [concurrent with position at UBC and FHL]
- Jan. 1983--1989. Research Associate, University of British Columbia in residence at the Friday Harbor Laboratories, the Bamfield Marine Station, or the Shannon Point Marine Ctr.: taxonomic and biogeographic research on red algae. [concurrent with position at WWU &FHL]
- June 1982--May 1985. Research Botanist, Friday Harbor Laboratories, University of Washington: research on floristics, biogeography, and taxonomy of marine algae. [concurrent with positions at WWU & UBC]
- August 1978--Jan. 1981. Research Associate, Department of Botany, University of British Columbia: working with R. F. Scagel and D. J. Garbary on the marine algal flora of British Columbia and Northern Washington and on the distribution and morphology of red and brown algae occurring in British Columbia and Alaska.
- Spring 1976--Summer 1977 Research Fellow, Farlow Herbarium of Harvard University: studies on red algal morphology.
- Fall 1968--Fall 1970. Aquatic Biologist with a specialty in algae (GS 7,9, and 11) for the Research Division, National Fisheries Center and Aquarium, U. S. Department of Interior, Washington, D. C.: research on the growth of marine algae in aquaria using artifical seawater.
- Summer 1966. Research Assistant to Dr. Donald Squires, Deputy Director, Museum of Natural History, Smithsonian Institute: zoogeographic mapping and taxonomy of deep-water corals, short paper on improving museum exhibits.

TEACHING EXPERIENCE:

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MARINE AND/OR GENERAL PHYCOLOGY

- Spring and Summer 1992, 1993, 1994, 1995 Instructor, Oregon State U.Seataqua Program, teaching "Our Valuable Seaweeds" to the public or to aquarium volunteers: a short 2-day course on the importance, use and identification of marine algae.
- Summer 1993, 1994, 1995 Co-Instructor with Evelyn McConnaughey, OSU's Seataqua Program, teaching "Collecting, Cooking, and Cultivating Sea Vegetables to the public: a 1 and 1/2 day course.

- Summer 1991 and 1994 Instructor, Oregon State U.: teaching an intensive 2-week (8-12 hrs/day) graduate-level course on Marine Algal Taxonomy. The course included lectures, labs, and numerous field trips.
- June and July 1991 Instructor, Oregon State U.: teaching a 4-week intensive course on Field Marine Botany for teachers.
- May 1990 and 1991 Instructor, Oregon State U..: teaching the 1-week Marine Algal section of the Marine Biology program for undergraduates.
- March to June 1989 Visiting Lecturer for Western Washington U.: teaching an 10-week undergraduate course on Algae at the Shannon Point Marine Ctr.
- June 1988 and Summer 1989 Visiting Lecturer for OSU's Hatfield Marine Science Ctr. teaching a 1week intensive course on Marine Algae for high school biology teachers and a 4-week fellowship writing a booklet on Marine Algae in the Laboratory -- for high school biology courses.
- March 1989 Instructor at the Breazeale Interpretive Center for a weekend course on "Our Valuable Seaweeds" May and June 1987 - Instructor at the Bamfield Marine Station for a 3-week intensive course on Marine Algae and Habitat Diversity.
- March to June 1982 Visiting Lecturer at the Friday Harbor Laboratories, U. of Washington: teaching an undergraduate 10-week intensive course in Phycology.
- Summer 1981 Visiting Lecturer at the Friday Harbor Laboratories, U. of Washington: team-teaching with R. F. Scagel a graduate-level intensive 6-week course in Marine Algology.
- Sept. 1981 to Jan. 1982 Assistant Professor, Limited Term at Simon Fraser U.: teaching an upper level undergraduate course on Algal Systematics. Summer 1977 - Lecturer for Suffolk U.: teaching a 6week course on Marine Botany at the R. S. Friedmann Cobscook Bay Labs in Edmunds, Maine.

MARINE ECOLOGY

- Fall 1994 Instructor for OSU and EPA, Newport: teaching a 1 week course on The Seaweeds and Seagrasses of Estuaries.
- Summer 1978 Lecturer for Suffolk U.: teaching 3 weeks of a 6-week course on Marine Ecology at the R. S. Friedmann Cobscook Bay Labs in Maine. I concentrated on macro-algal ecology during my half of the course.

NON-VASCULAR PLANTS

- Feb. 1985 to May 1985 Visiting Assistant Professor at Simon Fraser U.: substitute teaching the last half of a course (the fungi and bryophytes) on Non-Vascular Plants (replacing Dr. L. Druehl).
- Jan. 1981 to Jan. 1982 Assistant Professor, Limited Term, at Simon Fraser U.: organizing and teaching the spring and fall courses (both lecture and lab) on Non-Vascular Plants.
- Spring 1975 Lecturer at the U. of North Carolina: teaching lectures and labs for the non-vascular plant part of a course on Plant Diversity.

INTRODUCTORY BOTANY

Fall 1977 to Spring 1978 - Visiting Assistant Professor at U. Massachusetts, Amherst: teaching the laboratories for a course in Introductory Botany.

ASSORTED COURSES

Fall 1970 to Summer 1973 - Graduate Teaching Assistant at the U. of North Carolina: laboratory instructor in General Botany, Algae, Marine Phycology, and a Survey of the Plant Kingdom.

Fall 1966 to Spring 1968 - Graduate Teaching Fellow at the U. of Vermont: laboratory instructor in General Microbiology, Advanced Microbiology, and Phycology.

SERVICE:

May 2000. Invited Participant in NSF's Biotic Surveys and Inventories Workshop, Orcas Island, WA Spring 1999. Organizer (with Martha Apple) for 13th Northwest Algal Symposium, 14-16 May 1999, Yachats, OR.

- Winter 1996 Invited Participant in "The Microbial World: the Foundation of the Biosphere", sponsored by the American Academy of Microbiology, Daytona Beach (FL), January 19-21: a white paper preparation conference.
- Fall 1995 "Working Scientists" Panel Member for Symposium on Undergraduate Women in Science, Corvallis, OR, Oct. 14th.

Spring 1995 - Seminar Series Organizer, Hatfield Marine Science Ctr., Newport, Oregon.

- Winter 1993 Member-at-Large (Meeting Organizer), Western Society of Naturalists Meetings, Newport, Oregon.
- Summer 1991 Oregon Coast Aquarium, Newport. Scientific reviewer of the signage for displays and exhibits on marine algae.

1987 - 1996 - Adviser, Northwest Algal Symposium -- for all new meeting organizers. Spring 1986 - Organizer, 2nd Northwest Algal Symposium, Bamfield Marine Station, Bamfield, British Columbia.

Fall 1984 - Founder, Convener and Organizer, 1st Northwest Algal Symposium, Friday Harbor Laboratories, Washington.

EDITORIAL EXPERIENCE:

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- 1976 to present Reviewer for the Journal of Phycology, the European Journal of Phycology, the National Science Foundation, and the Guggenheim Foundation.
- Summers 1964 and 1965 Editorial Assistant, Publications Branch, Office of Education, U. S. Department of Health, Education and Welfare: editing and proof-reading manuscripts, galley and page proofs being published by HEW.

TECHNICAL EXPERIENCE:

Identification of macro and microalgae, isolation and culture techniques (for algae, fungi, bacteria, and viruses), histochemical techniques (including fluorescent stains), photomicrography, photomacrography, pen and ink illustration, curatorial skills, SCUBA diving (NAUI), computer skills (including word processing and database use --MS Word, Wordstar, Papyrus, MS Excell, MS PowerPoint, MS Access, some FoxPro).

2001 EXXON VALDEZ TRUS October 1, 2000 - September 30, 2001

Proposed Authorized Budget Category: FY 2000 FY 2001 \$28,288.0 Personnel (including benefits) \$8,005.0 Travel \$6,825.0 Contractual Commodities \$350.0 \$2,500.0 LONG RANGE FUNDING REQUIREMENTS Equipment \$45,968.0 Estimated Subtotal \$19,766.0 FY 2002 OSU Indirect Cost Rate = 43% Project Total \$65,734.0 Full-time Equivalents (FTE) 0.4 Dollar amounts are shown in thousands of dollars. Other Resources

Comments:

	Project Number: 01551~BAA Project Title: A checklist and distributional analysis of marine algal	FORM 4A
FY01	species collected as vouchers during the CHIA-EVOS studies Name: Gayle I. Hansen	Non-Trustee SUMMARY
- u.a. al.		

Prepared:

2001 EXXON VALDEZ TRUST

October 1, 2000 - September 30, 2001

Pers	sonnel Costs:			Months	Monthly		Proposed
	Name	Position Description		Budgeted	Costs	Overtime	FY 2001
	Gayle I. Hansen	Principal Investigator		4.0	6808.0		27,232.0
		\$18400 + 48% fringe					0.0
							0.0
	Yet to be determined	Curatorial Assistant					0.0
		\$960 + 10% fringe-\$1056		0.5	2112.0		1,056.0
							0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		4.5	8920.0	0.0	
			-		Per	sonnel Total	\$28,288.0
Trav	vel Costs:	· · · · · · · · · · · · · · · · · · ·	Ticket	Round	Total	Daily	Proposed
	Description (flight costs a	re from: Travel.Yahoo.Com)	Price	Trips	Days	Per Diem	FY 2001
	1. Newport to Juneau to ex	amine and annotate specimens,	550.0		40	100.0	0.0
	analyze the data, and dis	scuss the manuscript	550.0	2	18	120.0	3,260.0
	additional = c	ar rental at \$40/day	005.0		18	40.0	720.0
	2. Newport to Berkeley to e	examine Alaskan type specimens, use the	265.0	1	12	110.0	1,585.0
	library, and discuss prob	iem species with the experts					0.0
		mosine service to Berkeley	40.0	1		1 10 0	40.0
	3. Newport to Anchorage to	or the EVOS Trustees meeting	500.0	1	3	140.0	920.0
	4. Newport to Estes Park, C	Joiorado, for the PSA meetings	550.0	1	ວ	110.0	1,100.0
	additional = L	Imosine service to the meeting	80.0	1			80.0
	addiionai – n	leeung registration	300.0	ł			300.0
							0.0
					I	Travel Total	\$8,005,0
						Traver rotar	φ0,000.0
		Ducie of Neurole on					
	FY01 Project Title: A checklist and distributional analysis of marine algal species collected as vouchers during the CHIA-EVOS studies						ersonnel
						(& Travel
		Name: Gayle I. Hansen	-				DETAIL
Dress						L	

Prepared:

2001 EXXON VALDEZ TRUST

October 1, 2000 - September 30, 2001

Con	ractual Costs:					Proposed
Des	ription					FY 2001
	Dr. Mike Stekoll, lead algal He will provide 2 weeks of t	PI on the EVOS/CHIA s me to help primarily win 2 weeks of time	studies, will co-author the pape th data analysis and graphics. salary benefits 51.3% overhead Total	er. He will also edit the final manus \$3,478 \$1,033 \$2,314 \$6,825	script.	\$6,825.0
				Con	tractual Total	\$6,825.0
Con	modities Costs:					Proposed
Des	ription					FY 2001
	Herbarium and computer su printer ink, dis	upplies: MS Office Prof skettes, etc.	fessional and Quatro Pro, her	barium paper and glue, brushes	,	300.0
	Long Distance phone calls t	o M. S. Stekoll				50.0
				Comm	odities Total	\$350.0
Pret	FY01 ared: April 12, 2000	Project Number: Project Title: A c species collected Name: Gayle I. I	hecklist and distributiona as vouchers during the C lansen	l analysis of marine algal CHIA-EVOS studies	FC Cor Cor [DRM 4B tractual & nmodities DETAIL

2001 EXXON VALDEZ TRUST October 1, 2000 - September 30, 2001

New Equipment Purchases:		Number	Unit	Proposed
Description		of Units	Price	FY 2001
 Notebook computer to he It must be fast to handle IBM Thinkpad 600X serie My current no other projects 	buse the database, use for data analyses and manuscript preparation. the database and portable for transport to Juneau and Berkeley. es are good (MicroWarehouse quotes them as starting at \$2500) tebook computer is old and slow and almost completely worn out from . It really should be replaced for this project.	1	2500.0	0.0 0.0 2,500.0 0.0 0.0 0.0 0.0
				0.0 0.0 0.0 0.0
Those purchases associated with	h replacement equipment should be indicated by placement of an R.	New Equ	ipment Total	\$2,500.0
Existing Equipment Usage:			Number	
			of Units	
Zeiss SR Stereo Microscope	e (Dour microscopes are for examining algar specimens)		1	
FY01	Project Number: Project Title: A checklist and distributional analysis of ma species collected as vouchers during the CHIA-EVOS stud Name: Gayle I. Hansen	arine algal lies	F	ORM 4B quipment DETAIL

SUBCONTRACT THROUGH UAF

Biogeography of intertidal benthic seaweeds in south-central Alaska.

NEED FOR THE PROJECT

During the CHIA studies by the University of Alaska, support was provided for the field studies, but, due to its litigation sensitivity, no support was given for publishing the data. This left a huge amount of information unavailable to the scientific community and to the public. This proposal is for financial support to assist with the preparation and publication of a peer-reviewed article on the occurrence and distribution of marine macroalgae in the oil spill study area collected by the CHIA teams.

Because so little was known about the marine algae of south-central Alaska, the CHIA algal teams (including the proposed PI) collected and pressed voucher specimens for identification from more than 100 sites visited during the study. At each site, at least one of every species present was collected, amounting eventually to many thousands of specimens. These were sent to the proposed PI in Newport, Oregon, where they were identified, curated to herbarium sheets, cataloged and labeled. With the help of two part-time assistants and many volunteers, she was able to finish the 7,300 sheet collection by the 1994 deadline, but then the funding ended. There was no support for editing the database or for publishing the results. Now, before this wealth of information on the occurrence and distribution of Alaskan marine algae is lost, it is important to revive and edit the data and to analyze and summarize the results for publication in a journal that will be available to all that are interested.

PROJECT DESIGN

A - Objectives.

The proposed publication will provide: checklists of the marine algae found in the Prince William Sound, Kenai Peninsula, and Kodiak/Cook Inlet regions studied by the CHIA teams. In addition, it will provide an analysis of these species distributions as they relate to geographic area, substratum type, wave exposure, and salinity and, when the data are available, to oil exposure and beach cleaning.

B -- Methods.

Preliminary work with respect to the data base will be performed by G. Hansen of HMSC. M. Stekoll will assist with data analysis and report writing. Although we are still in the process of determining which analyses to use, some of the species group characteristics and preferences that we will try to reveal are:

widespread vs. narrow distributions.

substratum preference (bedrock, boulder or cobble).

exposure preference (exposed or sheltered, and aspect).

low salinity tolcrance (if salinity data is available)

oil exposure and cleanup tolerance and/or quick recovery.

Most of these preference or similarity groups can be determined through simple queries. If necessary we will perform more elaborate analyses. After obtaining our results, we will overlay the biological features of the species, particularly those that relate to taxonomy and life history.

Prepared 04/12/2000

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Project

The influence of these genetic features on the group preferences will be discussed A manuscript will be prepared for submission to *Botanica Marinia* which will include a summary of the information detailed above.

UAF JCSF0S

C-- Project Milestones and Endpoints

July 1, 2001:	Completion of collection annotations and database corrections
	Completion of analyses
Sept. 30, 2001:	Completion and submission of manuscript

Completion Date: September 30, 2001

PUBLICATIONS AND REPORTS

Hansen, G. L, and M. S. Stekoll. "A checklist and distributional analysis of marine algal species collected as vouchers during the CHIA- Exxon Valdez oil spill studies". We will submit our manuscript during the summer of 2001 to *Botanica Marina*, a journal that frequently includes biogeographic studies of this type.

PROFESSIONAL CONFERENCES.

Phycological Society of America, Fort Collins, Colorado. July 2001. "A distributional analysis of marine algal species collected by the University of Alaska during the Exxon Valdez oil spill studies in south-central Alaska".

PRINCIPAL INVESTIGATOR QUALIFICATIONS (for the subcontract)

Dr. Michael Stekoll is a Professor of Biology at the University of Alaska Southeast, and the School of Fisheries and Ocean Sciences at the University of Alaska Fairbanks. He has served as the Principal Investigator for the coastal habitat injury assessment (CHIA) study and Herring Bay experimental and monitoring studies that examined the impacts of the EVOS on intertidal and subtidal algae. His specialties include studies of *Fucus*, *Macrocystis*, and other seaweeds in Alaska.

BUDGET:

Stekol	1.	
	Salaries and Leave (80 hours)	\$3,478
	Benefits	1,033
	Overhead @51.3%	2,314
Total		\$6,824

Prepared 04/12/2000

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UAF JCSF05

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Gayle hwuxan oli spill porject 2001-2002. Apr-00

Salaries and	Lauve, Hour Stakoù ResToch	5 5/hr 60 42,80 0 11,5	0,014 i 0	Total \$3,475 \$0	52,478
Benefits	Stehool Yech	Benefits 0.293 0.077	r Subtorad	57,033 D2	\$1,033
			Selatios +	Benefits	\$4,510
Travel	Nes. T Domestic JNU-Meeting Per Diam	inges Each 0 200 0 1400 0 131	2	50 50	57
Services	Sub-Contracts -dis Conversionation Draftingklupicatio Liaraty searches Equipment rentime Publication come Postage shipping Boat changes Miss: services	ring sûntessance freight		ងដដ្ឋជនជា	
Supplies	Flaid goar			50	
Equipment Tuitica	Cred	Na cach			50 50
	65	0 31	2	50	\$0.
Total Direct Costs					\$4,510
Qverhoed	Ratte C	1575			12,314
Total Projuct Costs \$6,834					

AUTHORIZED UAF SIGNATURES WILL NOT BE AVAILABLE FOR ONE MORE WEEK.

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