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FY 2002

Detailed Project Descriptions and Budgets

Exxon Valdez Oil Spill Trustee Council

645 G Street, Suite 401, Anchorage, AK 99501-3451 907/278-8012 fax:907/276-7178



MEMORANDUM

TO: Restoration Work Force PAG Representatives (Chuck Meacham, Chris Blackburn)

FROM: Grandra Schubert, Program Coordinator

RE: FY 02 Restoration Proposals

DATE: April 18, 2001

This set of binders contains the Detailed Project Descriptions and detailed budgets submitted in response to the Trustee Council's FY 02 *Invitation to Submit Restoration Proposals*. In all, 107 research/monitoring/general restoration proposals totaling \$10.4 million were received. Two additional proposals (02100/Administration and 02126/Habitat Protection Support) will be funded outside of the work plan. The Council's funding cap for FY 02 is \$6.5 million (\$1.5 million is expected for 02100 and \$5 million for the work plan).

The front pocket of the first binder contains two spreadsheets:

- 1. A list of all proposals in numeric order. This list contains the project's assigned number and title, the name of the individual who submitted the proposal, and the project's assigned research cluster.
- 2. A list of all proposals by resource cluster. In addition to project number, title, and proposer, this list contains an abstract of the project, the project's assigned lead agency, the amount of funding requested for FY 02, and the project's duration (the number of years for which funding is being requested from the Trustee Council). For continuing projects, the spreadsheet also contains the FY 01 projection of the amount of funding needed in FY 02 (this column is labeled "FY 02 Expected"). Funding requests from non-Trustee agencies have been adjusted by Restoration Office staff to include agency "GA" (general administration).

Both of the spreadsheets are marked DRAFT. Please give me a call if you find any errors or omissions. Lead agencies and research clusters were assigned by Restoration Office staff, and are open to discussion.

The meeting of the Executive Director, Restoration Work Force, and two PAG members to develop the Draft Work Plan will be held in the Restoration Office (4th floor conference room) at 10:00 am Wednesday, June 6, 2001.



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معاملات فالدر البيعي والعمار مراف

<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
L .2-BAA	Photographic and Acoustic Monitoring of Killer Whales in Prince William Sound and Kenai Fjords	C. Matkin/North Gulf Oceanic Society	Marine Mammals
02052	Community Involvement Planning for GEM	P. Brown- Schwalenberg/CRRC	Subsistence
02100	Public Information, Science Management, and Administration	All Trustee Council Agencies	Public Information/Science Mgt./Admin.
02126	Habitat Protection and Acquisition Support		Habitat Protection
02144	Common Murre Population Monitoring	D. Roseneau/USFWS	Seabird/Forage Fish and Related Projects
02154	Archaeological Repository, Display Facilities, and Exhibits for Prince William Sound and Lower Cook Inlet	J. Bittner/ADNR	Archaeological Resources
02159	Surveys to Monitor Marine Bird Abundance in Prince William Sound During Winter and Summer 2002	D. Irons/USFWS	Seabird/Forage Fish and Related Projects
02163-BAA	Alaska Predator Ecosystem Experiment in Prince William Sound and the Gulf of Alaska (APEX)	D. Duffy/Paumanok Solutions	Seabird/Forage Fish and Related Projects
02163M	Numerical and Functional Response of Seabirds to Fluctuations in Forage Fish Density	J. Piatt/USGS	Seabird/Forage Fish and Related Projects
Ŷ	Construction of a Linkage Map for the Pink Salmon Genome	F. Allendorf/Univ. Montana	Pink Salmon
02195	Pristane Monitoring in Mussels	J. Short, P. Harris/NOAA	SEA and Related Projects
02210	Youth Area Watch	R. DeLorenzo/Chugach School District	Subsistence
02245	Community-Based Harbor Seal Management and Biological Sampling	V. Vanek/ADFG, M. Riedel/Alaska Native Harbor Seal Commission	Marine Mammals
02247	Kametolook River Coho Salmon Subsistence Project	J. McCullough, L. Scarbrough/ADFG	Subsistence
02250	Project Management	All Trustee Council Agencies	Project Management
02256B	Sockeye Salmon Stocking at Solf Lake	D. Gillikin/USFS	Subsistence
02290	Hydrocarbon Database and Interpretation Service	J. Short, B. Nelson/NOAA	Nearshore Ecosystem
02320	Sound Ecosystem Assessment (SEA): Printing the Final Report	W. Hauser/ADFG	SEA and Related Projects
02333	Sea Otter Monitoring	B. Henrichs/Native Village of Eyak	Subsistence
02340	Toward Long-Term Oceanographic Monitoring of the Gulf of Alaska Ecosystem	T. Weingartner/ UAF	Ecosystem Synthesis/GEM Transition

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<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
62-20	Alaska SeaLife Center Bench Fees		Public Information/Science Mgt./Admin.
02360-BAA	The Exxon Valdez Oil Spill: Guidance for Future Research Activities	C. Elfring/Polar Research Board, NRC	, Ecosystem Synthesis/GEM Transition
02372	Steller Sea Lion Monitoring	B. Henrichs/Native Village of Eyak	Subsistence
02395	Planning for Long-Term Monitoring in the Nearshore: Designing Studies to Detect Change and Assess Cause	T. Dean/Coastal Resources Associates, et al	Nearshore Ecosystem
02396	Alaska Salmon Shark Assessment	J. Rice, L. Hulbert/NOAA	Cutthroat Trout, Dolly Varden, and Other Fish
02401	Assessment of Spot Shrimp Abundance in Prince William Sound	C. Hughey/ Valdez Native Tribe, C. O'Clair/ NOAA	Subsistence
02404	Testing Archival Tag Technology in Alaska Salmon	J. Nielsen/USGS-BRD	Cutthroat Trout, Dolly Varden, and Other Fish
02407	Harlequin Duck Population Dynamics	D. Rosenberg/ADFG	Nearshore Ecosystem
02416	O'Brian Creek Enhancement	Chenega Bay IRA Council	Subsistence
3	Patterns and Processes of Population Change in Selected Nearshore Vertebrate Predators	J. Bodkin, D. Esler/USGS-BRD, T. Dean/CRA, Inc.	Nearshore Ecosystem
02434	Design of a Video System for Remotely Monitoring Seabirds at East Amatuli Island	A. Kettle/USFWS	Seabird/Forage Fish and Related Projects
02441-BAA	Harbor Seal Recovery: Effects of Diet on Lipid Metabolism and Health: Manuscript Preparation	R. Davis/Texas A&M	Marine Mammals
02452-BAA	Assessing Prey and Competitor/Predators of Pink Salmon Fry	R. Thorne/PWSSC	SEA and Related Projects
02455	Gulf Ecosystem Monitoring and Research Program Data System	Restoration Office	Ecosystem Synthesis/GEM Transition
02457-BAA	Monitoring the Fall-Winter Herring Biomass to Track the Recovery of the Prince William Sound Herring Stock	R. Thorne/ PWSSC	Pacific Herring
02462	Effects of Disease on Pacific Herring Population Recovery in Prince William Sound	G. Marty/Univ. of California, Davis	Pacific Herring
02475-BAA	GEM Data System Specification	S. Marley	Ecosystem Synthesis/GEM Transition
02476	Effects of Oiled Incubation Substrate on Pink Salmon Reproduction	R. Heintz/NOAA	Pink Salmon
66179	Effects of Food Stress on Survival and Reproductive Performance of Seabirds	J. Piatt/USGS-BRD, A. ¹ Kitaysky/Univ. of Washington	Seabird/Forage Fish and Related Projects

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Pr	oj.No.	Project Title	Proposer	Resource Cluster
L	36-BAA	Links Between Persistent Oil in Mussel Beds and Predators	S. Rice/NOAA, T. Dean/Coastal Resources Associates, S. Jewett/UAF	Nearshore Ecosystem
02	492	Were Pink Salmon Embryo Studies in Prince William Sound Biased?	J. Thedinga/NOAA	Pink Salmon
02	503	Orca Inlet Restoration	B. Henrichs/Native Village of Eyak	Subsistence
02	507	Nuchek Subsistence Camp	B. Henrichs/Native Village of Eyak	Subsistence
02	532	Coupling of Oceanic and Nearshore: The Search for Indicator Species	G. Irvine/USGS	Nearshore Ecosystem
; 02	535	EVOS Trustee Council Restoration Program Final Report	EVOS Restoration Office	Public Information/Science Mgt./Admin.
02	536	Synthesis of Spill Damaged Resource Information into the Heritage Data Management System	T. Gotthardt, K. Boggs/UAA	Ecosystem Synthesis/GEM Transition
02	538	Evaluation of Two Methods to Discriminate Pacific Herring Stocks along the Northern Gulf of Alaska	T. Otis/ADFG, R. Heintz/NOAA	Pacific Herring
02	543	Evaluation of Oil Remaining in the Intertidal from the <i>Exxon Valdez</i> Oil Spill	J. Short/NOAA	Nearshore Ecosystem
	6	Assessing Harbor Seals: Methods to Identify Metabolic Responses to Environmental Change	M. Castellini/UAF	Marine Mammals
02:	550	Alaska Resources Library and Information Services (ARLIS)	All Trustee Council Agencies	Public Information/Science Mgt./Admin.
02	552-BAA	Exchange Between Prince William Sound and the Gulf of Alaska	S. Vaughn/Prince William Sound Science Center	SEA and Related Projects
02	556	Mapping Marine Habitats: The First Step in a Spatially Nested Monitoring Program	C. Schoch/Kachemak Bay Research Reserve	Nearshore Ecosystem
02	558	Harbor Seal Recovery: Application of New Technologies for Monitoring Health	S. Atkinson/UAF	Marine Mammals
02	561	Evaluating the Feasibility of Developing a Community- Based Forage Fish Sampling Project for GEM	D. Roseneau/USFWS	Seabird/Forage Fish and Related Projects
02	565	Bottom-Up vs. Top Down: What Forces Control Variability in Kachemak Bay?	C. Schoch/Kachemak Bay Research Reserve	Nearshore Ecosystem
025	569	Linked Monitoring Network for the Gulf of Alaska: A Workshop	C. Schoch/Kachemak Bay Research Reserve, G. Eckert/UAS	Nearshore Ecosystem
02:	570	Book on EVOS Science for General Readers	S. Loshbaugh/Freelance Writing	Public Information/Science Mgt./Admin.
024 ()	574-BAA	Assessment of Bivalve Recovery on Treated Mixed-Soft Beaches in Prince William Sound	D. Lees/Littoral Ecological & Environmental Services	Nearshore Ecosystem
02	578	The Marine Macrofauna of Prince William Sound: An Annotated List	N. Foster, H. Feder	Nearshore Ecosystem

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<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
LJ4	Evaluation of Airborne Remote Sensing Tools for GEM Monitoring	E. Brown/UAF, J. Churnside/NOAA	Ecosystem Synthesis/GEM Transition
02589-BAA	PWSRCAC - EVOS Long Term Environmental Monitoring Program	J. Devens/ PWSRCAC	Nearshore Ecosystem
02593	River Otters and Fishes in the Nearshore Environment: A Synthesis	S. Jewett/UAF	Nearshore Ecosystem
02597-BAA	Ocean Color Time Series of Prince William Sound	S. Pegau/ OSU	Ecosystem Synthesis/GEM Transition
02600	Synthesis of the Ecological Findings from the EVOS Damage Assessment and Restoration Programs, 1989-2001	R. Spies/EVOS Chief Scientist, et al	Ecosystem Synthesis/GEM
02601-BAA	GEM Transition: Addressing Methodological Data Gaps	T. Kline/ PWSSC	SEA and Related Projects
02603	Implementation of an Ocean Circulation Model: A Transition from SEA to GEM	J. Wang/UAF	SEA and Related Projects
02604	Gear Selectivity in Trawl Surveys along the Northern Gulf of Alaska	W. Bechtol/ADFG	Ecosystem Synthesis/GEM Transition
02608	Permanent Archiving of Specimens Collected in Nearshore and Deep Benthic Habitats	N. Foster/UAF	Nearshore Ecosystem
6	Long-Term Temperature/Salinity Monitoring Within the Alaska Coastal Current	T. Weingartner/UAF	Ecosystem Synthesis/GEM Transition
02610	Kodiak Archipelago Youth Area Watch	T. Schneider/Kodiak Island Borough School District	Subsistence
02612	Detecting and Understanding Marine-Terrestrial Linkages in the Kenai River Watershed	W. Hauser/ADFG	Habitat Improvement
02614	Monitoring Program for Near-Surface Temperature, Salinity, and Fluorescence in the Northern Pacific Ocean	S. Okkonen/UAF	Ecosystem Synthesis/GEM Transition
02617	Standing Stock and Secondary Production of Zooplankton in Prince William Sound	R. Hopcroft, K. Coyle/UAF	SEA and Related Projects
02618-BAA	Measurements of Tide Rip Front Variability in Cook Inlet	S. Saupe/CIRCAC	Ecosystem Synthesis/GEM Transition
02621	Kenai River Flats Conservation Easement and Public Education	M. Kuwada/ADFG	Habitat Improvement
02622	Digital Maps from Existing Seasonal Environmental Sensitive Area Maps: Cook Inlet/ Kenai Peninsula	J. Whitney/ NOAA	Ecosystem Synthesis/GEM Transition
02624-BAA	A CPR-Based Plankton Survey Using Ships of Opportunity to Monitor the Gulf of Alaska	S. Batten/SAHFOS, D. Welch/DFOC	Ecosystem Synthesis/GEM Transition

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<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
С.7-ВАА	A Symbiotic Acoustic Signal Processor to Increase Stock Assessment Effort	J. Dawson/BioSonics, Inc.	Ecosystem Synthesis/GEM Transition
02628-BAA	Resurrection Bay Contaminant Survey	P. Homan/ Qutekcak Native Tribe	Ecosystem Synthesis/GEM Transition
02629-BAA	Development of a Paradigm for Ecosystem	R. Thorne/PWSSC	Ecosystem Synthesis/GEM Transition
02 630	Planning for Long-Term Monitoring and Research Program	Restoration Office	Ecosystem Synthesis/GEM Transition
02633	Acquisition of Chemical, Physical, and Biological Information on Kodiak Regional Water Quality	R. Ward/Kodiak Area Native Association	Ecosystem Synthesis/GEM Transition
02634	Expanding the Seabird Tissue Archival and Monitoring Project (STAMP) Program for GEM	D. Roseneau/USFWS, G. York/BRD, P. Becker/NIST	Seabird/Forage Fish and Related Projects
02636-BAA	Ecosystem Recovery Through a Partnership with the Spill-Impacted Communities	K. Adams, B. Perrine, R. Mullins/Cordova	Ecosystem Synthesis/GEM Transition
02637	Online Early Life History Database for the Northeast Pacific Ocean, Gulf of Alaska and Southeast Bering Sea	J. Duffy-Anderson/NOAA	Ecosystem Synthesis/GEM Transition
02639	Field Experiments for Testing Spill-Impacts Hypotheses from Long-Term Monitoring	G. Shigenaka/NOAA HAZMAT	Nearshore Ecosystem
02 640	High Frequency Surface Wave Radar Test in Prince William Sound	A. Kotlarov/Alaska Marine Technology Corp.	Ecosystem Synthesis/GEM Transition
02643	Design of the Environmental Specimen Bank Program for GEM	P. Becker/NIST	Ecosystem Synthesis/GEM Transition
02644	Molecular Biomarkers as a New Technique for Assessing Physiological Contaminant Stress	G. Shigenaka/NOAA HAZMAT	Nearshore Ecosystem
02646-BAA	Information Dissemination through the Web: Developing an Interactive Database on Southcentral Alaskan Seaweeds	M. Stekoll/UAS	Nearshore Ecosystem
02648-BAA	Cost Effective Data Acquisition Using Adaptive Sampling and Combining Information Strategies	D. Dorsett/Baylor Univ.	Ecosystem Synthesis/GEM Transition
02649	Reconstructing Sockeye Populations in the Gulf of Alaska over the Last Several Thousand Years	D. Finney/UAF	Sockeye Salmon
02652	Links Between Persistent Oil in Mussel Beds and Predators	S. Rice/NOAA, T. Dean/Coastal Resources Associates, S. Jewett/ UAF	Nearshore Ecosystem
-ваа	Transition Support for the GEM Data Manager	C. Falkenberg/ECOlogic Corp.	Ecosystem Synthesis/GEM Transition

<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
6	Retrospective Analysis of Nearshore Marine Communities Based on Analysis of Archaeological Material and Isotopes	G. Irvine/USGS, J. Schaaf/NPS	Nearshore Ecosystem
02657	Analysis of Genomic Stress Response in Sea Otters	C. Mohr, J. Stott/UC Davis, B. Ballachey/USGS	Nearshore Ecosystem
02659	Preparation and Publication of Results from SEA and NVP Avian Predation Studies	M. Bishop/ PWSSC	Seabird/Forage Fish and Related Projects
02662	Natural Life Restoration by Manulipitation	J. Rusher/Rusher's Services	Nearshore Ecosystem
02663	"Watchdog Tool" for Sampling and Monitoring	J. Rusher/Rusher's Services	Nearshore Ecosystem
02664	Retrospective Analysis of 30 Years of Seabird Distribution and Diet Data	J. Piatt/USGS	Seabird/Forage Fish and Related Projects
02667	Effectiveness of Citizens' Environmental Monitoring Program	S. Mauger/Cook Inlet Keeper	Ecosystem Synthesis/GEM Transition
02668	Developing an Interactive Water Quality and Habitat Database and Making it Accessible on the Web	J. Cooper/Cook Inlet Keeper	Ecosystem Synthesis/GEM Transition
02669	Hooligan Research	B. Henrichs/Native Village of Eyak	Subsistence
0~~~1-ВАА	Coordinating Volunteer Vessels of Opportunity to Collect Oceanographic Data in Kachemak Bay and Lower Cook Inlet	D. Stram, C. Schoch/Kachemak Bay Research Reserve	Ecosystem Synthesis/GEM Transition
02673	Continuing Decline of Pigeon Guillemots in the Oiled Portion of Prince William Sound	D. Irons/USFWS, D. Roby/OSU	Seabird/Forage Fish and Related Projects
02674-BAA	Assessing Pigeon Guillemot Restoration Techniques and Feathers as Biomonitors	J. French/Pegasus Enterprises, G. Divoky/UAF	Seabird/Forage Fish and Related Projects
02677	English Bay River Sockeye Salmon Enumeration Project	C. Kvasnikoff/Nanwalek IRA Council	Subsistence
02678-BAA	Identifying Community-Based Ways to Use Commercial Fisheries Bycatch for Scientific Gain	W. Wilson/ LGL Alaska Research Associates	Ecosystem Synthesis/GEM Transition
02680	Remote Delivery of Persistent Organic Contaminants in Alaska Fishes	S. Rice, J. Short, A. Moles/NOAA	Ecosystem Synthesis/GEM Transition



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INDEX OF PROPOSALS BY ROURCE CLUSTER -- FY 02

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	Request
Pink Salmo	on	<u> </u>			\$279.0	\$231.8	\$116.3
02190	Construction of a Linkage Map for the Pink Salmon Genome	F. Allendorf/Univ. Montana	ADFG	Cont'd 7th yr., 7	\$240.0 yr. project	\$168.0	\$80.3
This proje traits that collected compared project, w	ect will complete the analysis of experiments conducted at the Alas are important to recovery of pink salmon (e.g., growth and surviva from Likes Creek are expected to return to Resurrection Bay and t d to returning adults to test for genetic differences in marine surviva which was scheduled to close out in FY 02, is now requesting \$80,3	ka SeaLife Center that use the linka I). Sexually mature adults from the the SeaLife Center in August and Se al and other life history traits (e.g., b 000 for FY 03.]	age map to te: 1999 cohorts eptember 200 ody size, egg	st for effec produced 1. Genoty number, a	ts of regions from wild pin pes in releas nd egg size)	of the gene k salmon ed fry will t . [Note: Th	ome on De Is
02476	Effects of Oiled Incubation Substrate on Pink Salmon Reproduction	R. Heintz/NOAA	NOAA	Cont'd 4th vr., 5	\$39.0 vr. project	\$39.8	\$36.0
Populatio the ability beginning return as represent do not ex	ons are maintained through successful reproduction; this project is of the parental generation (P1) to produce offspring (F1) is under g in FY 01. After the F1 emerges in spring 2001, the fish will be ma mature adults. At that time, the project will measure the ability of t ts a genetic effect transmitted to unexposed generations. Such an tist.	designed to determine if exposure to way. The P1 was exposed when the arked and released. At the end of F the F1 to produce viable offspring (F effect was demonstrated in similarly	o oil impairs p ey incubated i Y 02, the rele 2). A diminis y treated pink	ink salmor n 1998; the ased fish v hed ability salmon in	n reproductio F1 incubate vill be recove to produce t 1997, but co	n. Examin ed in clean red when t he F2 gene prroborating	ation of water hey eration g data
02492	Were Pink Salmon Embryo Studies in Prince William Sound	J. Thedinga/NOAA	NOAA	Cont'd		\$24.0	\$0.0
Effects of contends times wer and previous shock res from a str were easi	f the oil spill on wild pink salmon embryo survival in Prince William that the government's conclusions that reduced embryo viability in re earlier in oiled streams than in reference streams. Experimenta iously dead eggs were conducted to help ascertain if estimates of e sistance of eggs increased in a sigmoidal fashion from the end of S ream is critical in differentiating shocked eggs from previously dead ily discernible and could easily be separated from previously dead	Sound are disputed among government oiled streams was caused by persi- l studies to determine the ability to determine the ability to determine the ability to determine the sound were a September to mid November and the d eggs. By removing eggs pumped eggs. These results suggest that fur	ment- and inde stent oil conta discriminate en ccurate or bia at the timing o from stream of urther examina	2nd yr., 2 ustry-spon amination v ggs killed t ised. Preli of egg exar gravel sooi ation of pro	sored resear vere biased l by sampling (minary result nination after n after samp ocedures use	chers. Exp because sa shock mor s indicate being pun ling, shock d for egg	kon Impling tality) that nped ed eggs

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
Pacific Her	ring				\$47.1	\$210.7	\$85.6
02457-BAA	Monitoring the Fall-Winter Herring Biomass to Track the Recovery of the Prince William Sound Herring Stock	R. Thorne/ PWSSC	NOAA	New 1st yr., 2	yr. project	\$86.0	\$85.6
The herrir have reve The spill i Fish and (surveys o	ng population in Prince William Sound has declined about fifty-fold aled intense predator activity on overwintering aggregations of he s implicated as a factor in this decline. A limited monitoring progr Game. Because of the critical state of this resource and its impor f adults and juveniles as a measure of mortality and an early indic	I since the oil spill and is in a virtual s erring, which includes several predato am has been maintained by the Oil S tance to the health of the sound, this eator of future recovery.	tate of collap rs that are el pill Recovery project will e	se. Recent ther threat Institute a xpand the	it infrared sc ened or oil-d nd the Alask survey effort	anning sun amaged sp a Departm by includin	/eys ecies. ent of ig fall
02462	Effects of Disease on Pacific Herring Population Recovery in Prince William Sound	G. Marty/Univ. of California, Dav	vis ADFG	Cont'd 4th yr., 3	\$0.0 vr. project	\$77.4	\$0.0
The Pacif predicts th relationsh importanc study is p	ic herring population of Prince William Sound has not recovered f hat fisheries closed since 1999 will not open for several years. Lo hip between disease prevalence and population change, and this i ce of Pacific herring in the Prince William Sound ecosystem, and t roposed to ensure seamless flow of data from this project to GEM	rom severe population decline in 199 ong-term systematic disease monitorin nformation significantly improves the the importance of this project to marin 1.	 The Alash ng and reseat ability to fore ne fisheries v 	ka Departm arch since 1 ecast popul vorldwide, a	nent of Fish a 1994 has sho ation change an additional	and Game : own a clear e. Because year of dis	now of the ease
0 2538	Evaluation of Two Methods to Discriminate Pacific Herring Stocks along the Northern Gulf of Alaska	T. Otis/ADFG, R. Heintz/NOAA	ADFG	Cont'd 2nd yr., 2	\$47.1 2 yr. project	\$47.3	\$0.0
This proje profile and analyzed future eva	ect will perform a comparative investigation of two promising stock alysis of select soft tissues. Limited samples from Sitka Sound, F to determine if stock differences are detectable by each procedur aluations of the temporal and structural (i.e., sex, age, maturity) st	x identification techniques for Pacific h Prince William Sound, Kamishak Bay, e, and at what scale. Successful resu ability of these biomarkers.	nerring ele Kodiak Islar ults from this	mental ana id, and Tog pilot study	lysis of otolit jiak will be co should be fo	hs and fatt bliected and bliowed up	y acid 1 with
SEA and R	Related Projects				\$150.6	\$551.3	\$140.0
02195	Pristane Monitoring in Mussels	J. Short, P. Harris/NOAA	NOAA	Cont'd 7th yr., 7	\$50.0 yr. project	\$55.0	\$55.0
This proje	ect has focused on elucidating the transport mechanism of pristan	e from Neocalanus ssp copepods inte	o mussels in	Prince Wil	liam Sound f	or the prev	ious six

This project has focused on elucidating the transport mechanism of pristane from *Neocalanus ssp* copepods into mussels in Prince William Sound for the previous six years. In FY 00 and FY 01 the utility of monitoring the response of pristane in mussels to mass-release of juvenile pink salmon from Prince William Sound hatcheries was successfully initiated, using pristane concentration levels. This project will continue with this direction to assess feeding conditions for juvenile pink salmon during the critical period of initial marine residence, and will forecast survivals through his period. Forecasts will be compared to actual returns to assess reliability. [Note: The principal investigators have proposed that this project be continued indefinitely.]

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INDEX OF PROPOSALS BY ROURCE CLUSTER -- FY 02

Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02320	Sound Ecosystem Assessment (SEA): Printing the	e Final Report	W. Hauser/ADFG	ADFG	Cont'd 8th yr., 8	\$0.0 s yr. project	\$6.2	\$0.0
This project 1,000 pages encumbered	will print, bind and distribute the Sound Ecosystem , s (some with color). Funding for copying, binding an d funds cannot be spent after June 30, 2001. The F	Assessment (S d mailing the fi Y 00 unused fu	EA) final report. The integrated finant report was provided in FY 00, build not should be under will lapse.	al report is it completion	a required on has bee	document ex en delayed ar	pected to d the	exceed
02452-BAA	Assessing Prey and Competitor/Predators of Pink	Salmon Fry	R. Thorne/PWSSC	NOAA	Cont'd	\$0.0	\$38.9	\$0 .0
					2nd yr., 3	2 yr. project		
Research si to make the Vehicle Sys interaction v design and i program.	nows that macro zooplankton and adult walleye polic se estimates was initiated in spring 2000 by a partne tem and the Alaska Department of Fish and Game. with Project 01195 which is studying the use of prist recommend procedures as a potential element in G	ock densities a ership of organ The Trustee C ane concentrat EM (the Truste	re the primary biological forcing vari izations including the Oil Spill Recor- council provided funds to expand th tion in mussels to estimate pink salr e Council's long-term monitoring pro-	ables effec very Institut is effort in t non fry sur ogram), OS	ting pink s te (OSRI), 2001 (Proj vival. FY 0 SRI, or a co	almon fry sur Sound Emer ect 01452), ir 2 funding will ombined insti	vival. A pr gency Res ncluding finalize the tutional mo	ogram ponse e survey onitoring
02552-BAA	Exchange Between Prince William Sound and the Alaska	Gulf of	S. Vaughn/Prince William Sound Science Center	NOAA	Cont'd 3rd yr., 3	\$100.6 3 yr. project	\$102.5	\$0.0
One of the I Alaska and northern Gu Hinchinbroo and salinity. series will b	east understood physical processes that influence the Prince William Sound. This project will document the of Alaska at Hinchinbrook Entrance, and identify no k Entrance to create time series of velocities spanning To identify the dominant factors that govern Prince e combined with meteorological and physical data com-	ne biological co ne interannual v nechanisms go ing three years William Sound ollected under	omponents of Prince William Sound variability in water mass exchange b overning this exchange. The project . The mooring will be equipped with d/Gulf of Alaska exchange, the moo other research programs already in	is the exch etween Pri will deploy a CTD to ring velocit progress.	ange betv nce Willia van upwar create a ti y and deel	veen the nort m Sound and d looking AD me series of p temperature	nern Gulf c the adjace CP moorin deep temp e/salinity tir	of ent g in erature ne
02601-BAA	GEM Transition: Addressing Methodological Data	Gaps	T. Kline/ PWSSC	NOAA	New		\$189.5	\$85.0
					1st yr., 2	yr. project		
Recent rese affect recrui landed fish a and anthrop the stable is isotope effe	earch using natural stable isotope abundance has sh tment and nutritional processes in fish. Prince Willia appear to undergo long-term systematic shifts. Accor ogenic trophic level effects on fish and other ecosys otope methodology that can be addressed within the cts among macro-zooplankton taxa and (2) develop	nown that the a am Sound isoto ordingly, GEM v stem componen e next year usin non-lethal isot	dvective regime connecting the nort ope data has also been used to mea will need to use stable isotope abund hts as part of long-term monitoring s ng GLOBEC and OSRI sampling pla ope sampling for fishes.	hern Gulf d Isure relativitance to ad tudies. Ho Itforms. Th	of Alaksa v ve trophic Idress the owever, the his study w	vith Prince W level. The tro effects of ad ere are prese vill (1) addres	illiam Sour ophic levels vective pro ntly data ga s inter-spe	nd may s of cesses aps in cies

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
026 03	Implementation of an Ocean Circulation Model: A Transition from SEA to GEM	J. Wang/UAF	ADFG	New 1st yr., 1	yr. project	\$73.2	\$0.0
This proj and a bio (about 3 for Envir	ect will establish a 3-D ocean circulation model in the Gulf of Alash plogical model. This model will cover the entire gulf, including Print 7km at 60"N). This model will be forced by tides, the Alaska Curre onmental Prediction.	ka to lay down a foundation for GEM ce William Sound and Cook Inlet. T ent inflow/outflow, freshwater discha	l in order to co he horizontal ı rge, and wind	uple this m resolution c stress deri	odel to a hyd of this model ved from the	drological n is 4'x2' mir National C	nodel nutes Senter
02617	Standing Stock and Secondary Production of Zooplankton in Prince William Sound	R. Hopcroft, K. Coyle/UAF	ADFG	New 1st yr., 1	yr. project	\$86.0	\$0.0
Understa Systema although set the s detailed	anding the seasonal cycles and inter-annual variability of zooplankt tic sampling of the zooplankton in central waters of Prince William the Gulf of Alaska GLOBEC program began in that same year, its tage for GEM activities by enhancing current sampling within the G analysis of recent nearshore zooplankton collected by Prince Willia	on is essential for understanding the Sound was discontinued in 1997 wis sampling techniques are not comp SLOBEC program to allow direct cor am Sound Aquaculture Corporation	e success of h th the complet arable to the S nparison to ea hatcheries.	igher verte tion of the \$ EA and ea rlier data s	brate trophic SEA project (rlier data set ets, and inte	levels. (/320) and s. This pro grate this v	oject will vith
Sockeye	Salmon					\$102.8	\$0.0
02649	Reconstructing Sockeye Populations in the Gulf of Alaska ov the Last Several Thousand Years	er D. Finney/UAF	ADFG	New 1st yr., 1	yr. project	\$102.8	\$0.0
This pro River wa What is historica	ject will reconstruct the last 2,000 years of changes in sockeye sali atershed) by analyzing ¹⁵ N in lake sediments. This new data will be the normal variability in sockeye salmon populations in the Gulf of I perspective on present conditions and by developing new hypothe	mon abundance in Eshamy Lake (P synthesized with ongoing studies a Alaska? This research will contribu eses about the climatic causes of po	rince William S t Karluk Lake (te to developm opulation fluctu	Sound) and Kodiak Isla ient of the lations in G	Upper Russ and). The re GEM program aulf of Alaska	ian Lake (search que m by provid salmon.	Kenai estion is: ding a
Cutthroat	Trout, Dolly Varden, and Other Fish	·······		· . · - <u>-</u> <u>-</u>	\$0.0	\$133.8	\$0.0
02396	Alaska Salmon Shark Assessment	J. Rice, L. Hulbert/NOAA	NOAA	Cont'd 3rd yr., 2	\$0.0 yr. project	\$29.2	\$ 0 .0
This proj analysis data trar collected during th contracted the proje	ect will fund a closeout year of data analysis and manuscript prepa and final write-up of (a) data transmitted from satellite tags deploy ismitted from satellite tags deployed on salmon sharks that will trand during 2001 field sampling and pre-arranged stomach sample col the 2001 commercial fishing season. The funding will also cover FY and data analysis. The final report will describe salmon shark move ect.	aration for this two year study of salr ed on salmon sharks that will be sch nsmit when sharks frequent surface lections from the Copper River gillno 2 Argos time, NOAA Joint Tariff A ments, habitat utilization, regional fie	non sharks in heduled to tran waters during et fleet and the greement cos delity, and diet	Prince Will smit during summer, a Prince Wi ts for satel compositio	iam Sound. 9 winter and 9 and (c) stoma Illiam Sound lite tag data on from data	Funding w spring of 2l ach sample salmon se recovery, a collected o	ill cover 002, (b) s ine fleet ind furing



•				514.00				
		INDEX OF PROPOSALS BY	R. JURCE CLUSTER -	-FY 02	.,		51/00	EV 03
Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	Request
02404	Testing Archival Tag	g Technology in Alaska Salmon	J. Nielsen/USGS-BRD	DOI	Cont'd		\$104.6	
					2nd yr., 2	? yr. project		
Gulf of Ala in Cook Inl (200-250m and growth implement recoveries salmon use	ska developed under P et. Salmon for this stu m) and released in Com for coho in captivity. S ation and retention of the will be done in the com e of marine habitats, m	roject 00478 will be applied in this study of r dy will be reared in captivity (at the Alaska E ok Inlet as part of the department's Ship Cre Ship Creek coho will be tagged mid-May. A nese tags. Surveys for early jack recoveries o commercial fishery in Cook Inlet and the d igration routes, contribution to the sport fishe	novement and migration paths for co Department of Fish and Game hatche eek sport-fishing hatchery release. F spring release experiment in the first will be done at the Ship Creek weir erby sport fishery on Ship Creek. An ery, and hatchery/wild interactions fo	oho salmon ery at Fort I Y 01 includ t year will b and among rchive tagg r salmon in	during ma Richardson es pilot stu e contingen sport fishe ed fish will Cook Inlei	turation in oc b) to 1+ year dies of tag ro nt on the suc ers. Monitori be used to d	cean enviro of age etention, be cessful ng for adul ocument c	onments ehavior, It tag coho
Marine Man	nmals		and a second			\$153.4	\$358.5	\$102.0
0201 2-B AA	Photographic and A Prince William Sour	coustic Monitoring of Killer Whales in Id and Kenai Fjords	C. Matkin/North Gulf Oceanic Society	NOAA	Cont'd 10th yr.		\$79.7	\$74.9
. This project Sound/Ker monitoring funds.	ct will continue the mon nai Fjords killer whales. with remote and vesse	itoring of the damaged AB resident pod and Monitoring has occurred on a yearly basis I-based hydrophone systems. The project o	the potentially endangered AT1 transince 1984. Methods include the ph continues interpretation of current an	sient popul oto-identific d previous	ation as we ation of ind data as we	ell other Prin dividual whal ell as data co	ce William es and acc llected with	oustic n other
02245	Community-Based I Sampling	Harbor Seal Management and Biological	V. Vanek/ADFG, M. Riedel/Alask Native Harbor Seal Commission	a ADFG	Cont'd 9th yr., 9	\$25.0 yr. project	\$26.8	\$0.0
Under this collect biol analysis ar and along sampling p	project, village-based t ogical samples from ha nd the University of Alas the Alaska Peninsula w program. FY 02 is the c	echnicians are selected by the Alaska Nativ rbor seals. The samples are transported to ska museum for archiving. In FY 02, the sa ill continue. The Alaska Native Harbor Sea lose out year for this project.	e Harbor Seal Commission and train Anchorage or Kodiak for further sar mple collection program in Prince W I Commission will produce and distril	ed by the A npling and illiam Soun oute a news	Alaska Dep distribution d, lower Co sletter with	artment of F to participat bok Inlet, aro summaries	ish and Ga ing scientis und Kodial of the biolo	ime to sts for k Island, ogical
02441-BAA	Harbor Seal Recove Health: Manuscript I	ry: Effects of Diet on Lipid Metabolism and Preparation	R. Davis/Texas A&M	ADFG	Cont'd 4th vr., 4	\$0.0 vr. project	\$68.1	\$0.0
This project to the Trus of lipid and under diffe	ct will complete the ana stee Council in FY 01. I I how it changes with di grent diets, and will allow	lysis of samples that were taken by this proj n addition, a final report and five manuscrip et in harbor seals. Analysis of the remaining v better interpretation of field data for wild ha	ect in earlier years, but that could no ts will be prepared. The results will p g samples is needed to resolve the to arbor seals.	t be comple provide a be emporal sc	eted due to etter under ale of chan	a shortage standing of t ges in fatty a	of funds av he nutrition acid compo	railable 1al role osition

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	Request
02546	Assessing Harbor Seals: Methods to Identify Metabolic Responses to Environmental Change	M. Castellini/UAF	ADFG	New 1st yr., 1	yr. project	\$50.4	\$0.0
This project seals. Muc animals ba GEM prop	ct will provide final design and sensitivity testing for a sampling s ch like the concept of genetic fingerprinting, this method uses a used on a suite of 20-30 blood chemistry values. The proposers osal. The FY 02 project will conduct the pre-development testin	cheme and software approach to mon novel blood chemistry fingerprinting te termed this method "Metabolic Identity g of the method and test its strength a	itoring popul chnique that y" and intend nd robustnes	ation-wide can easily to use it a s.	health patter separate su s the core of	rns in harbo b-populatio f a long-run	or ns of ning
02558	Harbor Seal Recovery: Application of New Technologies for Monitoring Health	S. Atkinson/UAF	ADFG	Cont'd 2nd yr., 3	\$128.4 yr. project	\$133.5	\$27.1
This projec harbor sea (IgG, IgM, brought int techniques added to th	ct will investigate the potential for new technologies to assess ar ils. Analysis of thyroxine (T_4), triiodothyronine (T_3), and cortisol (and IgA) and the body burden of organochlorine contaminants v to the Alaska SeaLife Center for rehabilitation. Once the profiles will be evaluated for routine monitoring of free-ranging seals in his project.]	nd monitor the endocrine and immune (primary metabolic and gluconeogenic will provide an assessment of both per s of healthy seals and those failing to th an effort to restore this species. [Note	systems as o hormones), manently cap nrive in their e: Alaska Sea	liagnostic r and measu otive seals natural env aLife Cente	neasures of rement of in as well as se rironment an er bench fee	the health nmunoglob eals that an e assessed s will need	of ulins e I, these to be
Nearshore I	Ecosystem				\$130.0	\$2,420.2	\$609.0
				0 11			
02290	Hydrocarbon Database and Interpretation Service	J. Short, B. Nelson/NOAA	NOAA	11th yr.	\$35.0	\$35.0	\$35.0
02290 This ongoi data repre restoration storage an	Hydrocarbon Database and Interpretation Service ng project provides data and sample archiving services for all samples collected since the oil spill in 1989 to the present a data. Additionally, this project provides interpretive services for d maintenance of the hydrocarbon sample archives. [Note: The	J. Short, B. Neison/NOAA amples collected for hydrocarbon analy and include environmental and laborato r hydrocarbon analysis, public releases e principal investigator has proposed th	NOAA ysis in suppo bry National s of the hydro nat this project	Contra 11th yr. rt of Truste Resource E carbon and ct be contin	\$35.0 e Council pr Damage Ass d pristane da nued indefini	\$35.0 rojects. Th essment a atabases, a tely.]	\$35.0 ese nd ind
02290 This ongoi data repre restoration storage an 02395	Hydrocarbon Database and Interpretation Service ng project provides data and sample archiving services for all se sent samples collected since the oil spill in 1989 to the present a data. Additionally, this project provides interpretive services fo ad maintenance of the hydrocarbon sample archives. [Note: The Planning for Long-Term Monitoring in the Nearshore: Design Studies to Detect Change and Assess Cause	J. Short, B. Nelson/NOAA amples collected for hydrocarbon analy and include environmental and laborato r hydrocarbon analysis, public releases e principal investigator has proposed th ning T. Dean/Coastal Resources Associates, et al	NOAA ysis in suppo ory National s of the hydro hat this project DOI	Contra 11th yr. rt of Truste Resource E ocarbon and t be contin New 1st yr., 2	\$35.0 e Council pr Damage Ass d pristane da nued indefini yr. project	\$35.0 rojects. Th essment a atabases, a tely.] \$92.0	\$35.0 ese nd .nd

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	Request
02407	Harlequin Duck Population Dynamics	D. Rosenberg/ADFG	ADFG	Cont'd 3rd yr., 4	yr. project	\$68.7	\$43.0
Harlequin d unoiled area recruitment surveys will FY 02 will b	uck populations have not recovered from the effects of as. This project will conduct late-winter boat surveys to will be compared between oiled and unoiled areas in Pr also help identify changes to the Gulf of Alaska ecosys e the final year of field-work for the project.	the oil spill. Populations are declining in oiled assess the recovery of ducks inhabiting oiled rince William Sound to assess trends, populati tem and improve the ability to differentiate bet	areas of Pri areas. Pop ion dynamic ween natura	nce Willian ulation stru s, and the I and man-	n Sound whil cture, abund progress of r -caused popu	e increasin ance, and ecovery. T ulation cha	g in The nge s .
02423	Patterns and Processes of Population Change in Sele	ected J. Bodkin, D. Esler/USGS-BRD, Dean/CRA_loc	T. DOI	Cont'd		\$361.6	\$250.0
and abunda Harlequin d between oil added to thi 02486-BAA	uck field studies will examine the relationship between a exposure and CYP1A induction, and metabolic and bel is project.] Links Between Persistent Oil in Mussel Beds and Pre	And the hearshole environment. In Pr 02, set ination of spatial and temporal patterns of cha survival and CYP1A. Captive experiments on navioral consequences of exposure. [Note: Al- edators S. Rice/NOAA, T. Dean/Coastal Resources Associates, S. Jewett/UAF	harlequin du harlequin du aska SeaLif	dance in re ucks will ex e Center b New 1st yr., 2	elation to pre amine the re ench fees with yr. project	y productio lationships I need to b \$170.8	e \$130.0
Links betwe Significant o vertebrate p future moni persistence	en oil-contaminated mussel beds and impacts on infau oil concentrations in some mussel beds have persisted predator exposure to oil. The possibility that oiled beds toring and response decisions in the event of future spil of <i>Exxon Valdez</i> oil in mussel beds, infauna, and in ne	na and vertebrate predators have been inferre to present, much longer that originally expecte are long-term sources of vertebrate contamina lls. In a more holistic approach that in the past arshore vertebrate predators.	ed, but have ed, and may ation was un t, this projec	not been d explain col anticipatec t will exam	lefinitively de ntemporary c I, and has im ine evidence	monstrated observation plications f for links be	l. s of or etw een
02532	Coupling of Oceanic and Nearshore: The Search for	Indicator G. Irvine/USGS	DOI	New	• •	\$121.3	\$0.0
This project	will (a) identify nearshare species where shundaness	are coupled with low frequency dynamic proce		1st yr., 1 rogimo shif	yr. project	in the acco	nio
realm, and f longer-term identifying p	that could serve as sentinels of change for GEM, (b) ex decline, increases, etc.), and (c) propose mechanisms processes that could also be monitored.	amine other types of trends occurring for near that could be responsible for cyclical or direct	sses (e.g., i shore specie ional change	egime shin es with hist es in specie	corical record es abundanc	s (e.g., es, thereby	anic

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
0254 3	Evaluation of Oil Remaining in the Intertidal from the <i>Exxon</i> Valdez Oil Spill	J. Short/NOAA	NOAA	Cont'd 2nd yr., 2	\$95.0 2 yr. project	\$113.1	\$0.0
This project be intensive will be samp preparation	will assess the amount of oil remaining from the oil spill on sho ly sampled for surface and subsurface oil to estimate length of led by digging about 8,000 pits to discover and quantify subsur of a final report, and journal publications. No fieldwork is prope	orelines within Prince William Sound oiled shoreline, area and volume of rface oil. In FY 02, Phase III of this p osed for FY 02.	in FY 01. A st oiled sedimen project will be o	tratified rar t, and volu devoted to	ndom sample me of oil. Ap data and che	e of shorelir oproximate emical anal	ne will ly 8 km ysis,
02556	Mapping Marine Habitats: The First Step in a Spatially Nester Monitoring Program	d C. Schoch/Kachemak Bay Research Reserve	ADFG	New 1st yr., 1	yr. project	\$50.0	\$0.0
Groups, indi Bay, and GE through time coast to gath physics of th	viduals, and programs as diverse as natural resource agencies EM can benefit from a comprehensive, high resolution database e. At present, no such detailed database or monitoring program her such habitat information in a cost-effective yet detailed man he environment to select replicate shore sites for monitoring alg	s, local governments, researchers, c e of shoreline and nearshore habitate n exists within the Gulf of Alaska. Th nner. The method relies on a nested gal and invertebrate diversity.	onservation ac s, and from inf his project will I hierarchical r	lvocates in ormation o use a metl hearshore o	Cook Inlet a on the physic hod adopted classification	and Kacher al changes along the l based on t	nak seen JS west the
02565	Bottom-Up vs. Top Down: What Forces Control Variability in Kachemak Bay?	C. Schoch/Kachemak Bay Research Reserve	ADFG	New 1st yr., 1	yr. project	\$49.9	\$0.0
This project (current pati understand research an	will establish intertidal and subtidal transects on rocky and sectors, nutrient concentrations, phytoplankton distributions) and the interaction of the nearshore oceanographic environment w d monitoring programs funded by the National Oceanic and Attractions	liment shores in Kachemak Bay and the spatial patterns of adult population ith coastal marine communities in the mospheric Administration in Kachem	will study the ons and their I e Gulf of Alask nak Bay and w	relationshij arvae over ka. The pro ill adopt pro	p between bo time. The p oject will part otocols deve	ottom-up co primary goa ner with ex loped by Pl	ontrols I is to tisting ISCO.
02569	Linked Monitoring Network for the Gulf of Alaska: A Worksho	op C. Schoch/Kachemak Bay Research Reserve, G. Eckert/	ADFG UAS	New 1st yr., 1	yr. project	\$15.3	\$0.0
There are ex oceanic regi workshop to monitoring t questions at	xcellent research models such as PICES and PISCO in the Lor ime shifts on recruitment and growth of intertidal and shallow s bring together researchers from across the Gulf of Alaska reg he neashore ocean of the North Pacific. A network of local res multiple spatial scales is envisioned.	wer 48 that integrate oceanographic subtidal organisms. However, no suc gion and the U.S. west coast to devel search organizations acting in concer	and shoreline th program exi op a coordinat t to adopt star	componer sts in Alas ed researc idardized p	nts to study ti ka. This pro ch program f protocols to a	ne effects c ject will cor or research address res	of avene a and earch
02574-BAA	Assessment of Bivalve Recovery on Treated Mixed-Soft Beaches in Prince William Sound	D. Lees/Littoral Ecological & Environmental Services	NOAA	New 1st yr., 2	yr. project	\$94.8	\$35.3
Studies from damaged in conclusions beaches are The study w	n 1989 through 1997 suggest that bivalve assemblages on bea terms of species composition and function. This project will as are accurate will indicate that a considerable proportion of mix functionally impaired in terms of their ability to support foragin ill also provide insight into the need for remediation of beaches	aches in Prince William Sound with h ssess the generality of this apparent ked-soft beaches in treated areas of ng by damaged nearshore vertebrate s to restore biodiversity and function	igh-pressure h injury to these the sound rem predators suc on these asse	ot-water w assembla ains extrer h as sea o mblages.	vashing rema iges. A findin nely disturbe otters and ha	in severely g that our d and that rlequin duc	these ks.



Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02578	The Marine Macrofauna of Prince William Sound: An Annotated List	N. Foster, H. Feder	NOAA	New 1st yr., 1	yr. project	\$38.3	\$0.0
Data sets as part of EVOS sta	that present basic taxonomic and biogeographic information at the s research on potential introductions of nonindigenous species. This akeholders.	species level for 1,645 animal specie project will make this important info	es form Prir mation ava	nce William allable to a r	Sound have wider group	e been con of users, ir	ipiled icluding
02589-BAA	PWSRCAC - EVOS Long Term Environmental Monitoring Program	J. Devens/ PWSRCAC	NOAA	New 1st yr.	an 1994 - Land (1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994	\$233.3	
This proje Peninsula mussel tis efficiency Council.	ect will provide essential long-term baseline measurements of hydroc a, Kodiak, and Gulf of Alaska. The objective is to provide a more con ssue that can be used to determine impacts of oil sources on the ecc in hydrocarbon sampling and analysis that has been ongoing since	carbon levels and sourecs at program nprehensive program for the collect osystem. This project will provide ar 1993 under the auspices of the Prin	n sites with ion of base i improved ce William	in areas of line data in link to reco Sound Reg	Prince Willi subtidal sec very status a ional Citizer	am Sound, liments and and greater is Advisory	Kenai t
02593	River Otters and Fishes in the Nearshore Environment: A	S. Jewett/UAF	ADFG	New		\$143.6	\$33.1
This proje Social org depender synthesiz beach-fri	ect will integrate data collected on river otters and fishes in Prince Wi ganization and population dynamics of river otters, specialized fish-prince of sociality in river otters on the availability of schooling fishes an e the data on the effects of fish distributions on otter sociality with the nge forests.	illiam Sound, through efforts of the h redators, are dependent on abundar d the contribution of intertidal/deme at on the effects of social communic	IVP (/025), nce and ava rsal fishes t ation of otte	APEX (/16 ailability of f to the diet c ers on nutri	3), and SEA fishes. This of solitary ott ent transpor	(/320) pro project will ers, and ts from sea	jects. test the a to
02608	Permanent Archiving of Specimens Collected in Nearshore and Deep Benthic Habitats	N. Foster/UAF	ADFG	New 1st vr., 1	vr. project	\$111.8	\$0.0
This proje environm deep ben	ect will support acquisition and archiving of marine invertebrate speci ental monitoring in Port Valdez between 1990 and 1995. Specimens thic communities. As a result of these efforts, there will be an impro-	imens collected as part of EVOS as represent a time series of samples ved set of baseline data for the mar	sessment s from eelgr ne biota of	tudies in P ass habitat Prince Wil	rince William is, kelp fores liam Sound.	n Sound an it habitats,	d and
02639	Field Experiments for Testing Spill-Impacts Hypotheses from Long-Term Monitoring	G. Shigenaka/NOAA HAZMAT	NOAA	New 1st yr., 1	yr. project	\$71.5	\$0.0
NOAA ini tests the experime recovery program, National I	tiated two intertidal experiments in 2000 to test hypotheses concerning hypothesis that aggressive shoreline cleanup has caused unnatural lent, in lower Herring Bay, tests the hypothesis that shoreline washing has been delayed and infaunal communities are fundamentally altered that program has ended. This project will permit annual sampling an Estuarine Research Reserve and the lower Herring Bay project to alt	ng long-term effects of oil spill clean long-term cycling in rocky intertidal o on oiled beaches physically alters g ed. Although both of these experime nd data collection while transitioning ernative funding support in 2003.	up. The fir communitie: rain size str nts were be the Kasitsr	st experime s, Fucus in ructure to tl egun under na Bay proj	ent, located i particular. he extent tha NOAA's ion ect to the Ka	in Kasitsna The second at biologica g-term mo achemak B	Bay, 1 I nitoring ay

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	Request
02644	Molecular Biomarkers as a New Technique for Asses Physiological Contaminant Stress	ssing G. Shigenaka/NOAA HAZMAT	NOAA	New 1st yr., 1	yr. project	\$114.1	\$0.0
This proje biomarke and lower setting (a small boa	ect has two primary objectives: first, a targeted evaluation/ rs) to assess extent and source of biological stress; and s Cook Inlet to contaminant type (i.e., fuel oils or antifouline nd particularly as a transitional bridge to GEM), but the wo tharbors in Prince William Sound and lower Cook Inlet.	/validation of new monitoring technology (based second, the linking of stress in mussels inhabiting g paint components). The monitoring tool has th ork as proposed will provide useful information o	on the me g small bo ne potentia n the biolo	asurement at harbor a I for applic gical statu	of a series of reas in Princ ation beyond s of mussels	of molecula ce William I this speci residing ir	ar Sound fic 1 six
02646-BAA	Information Dissemination through the Web: Develop	bing an M. Stekoll/UAS	NOAA	New		\$58.0	\$37.5
	Interactive Database on Southcentral Alaskan Seawe	eds		1st yr., 3	yr. project		
In order to With this The webs	b begin to overcome this problem, this project will produce as a reference, the project will query Alaska Native comm site will develop incrementally as species are added and c Links Between Persistent Oil in Mussel Beds and Pre	e a Web-based database of algal images and di- nunities for information on the traditional uses of comments from users are incorporated. [Note: The edators S. Rice/NOAA, T. Dean/Coastal Resources Associates, S. Jewett/	stributions the specie nis project NOAA	that will fa es and add also reque New 1st yr., 2	cilitate speci this data to ested \$26.9 f yr. project	es identific the final pro or FY 04.] \$51.1	ations. oduct. \$27.1
Links beth Significar vertebrate future mo persisten	ween oil-contaminated mussel beds and impacts on infau at oil concentrations in some mussel beds have persisted be predator exposure to oil. The possibility that oiled beds onitoring and response decisions in the event of future spil ce of <i>Exxon Valdez</i> oil in mussel beds, infauna, and in ne	ina and vertebrate predators have been inferred to present, much longer than originally expected are long-term sources of vertebrate contaminati lls. In a more holistic approach than in the past, arshore vertebrate predators.	, but have I, and may on was un this projec	not been d explain co anticipateo ot will exam	lefinitively de ontemporary I and has im nine evidence	monstrate observatio plications f e for links t	d. ns of or between
02656	Retrospective Analysis of Nearshore Marine Commun Based on Analysis of Archaeological Material and Iso	nities G. Irvine/USGS, J. Schaaf/NPS otopes	DOI	New 1st yr., 2	yr. project	\$98.6	\$18.0
This proje analyses. Changes habitat ch periods o	ect will investigate long-term (6,300 year) patterns of product These analyses will focus on excavated midden remains in nearshore marine communities will be assessed throug anges. Isotopic analysis of shells will provided an assess f climate change.	uctivity and relative species abundances in near s of very rich, well-dated archaeological sites alo gh examination of relative species abundances, sment of long-term productivity patterns in the ne	shore, inte ng the Kat size-freque earshore n	rtidal comi mai Natior ency analy narine envi	munities via nal Park and sis, and othe ronment as r	retrospecti Preserve o r indicators related to n	ve xoast. s of najor



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02657	Analysis of Genomic Stress Response in Sea Otters	C. Mohr, J. Stott/UC Davis, B. Ballachey/USGS	DOI	New 1st yr., 1	yr. project	\$43.5	\$0.0
In summ project w metaboli differenti understa	er 2001, as part of Project 01423, sea otters will be captured in o vill complement Project 01423, by applying novel, highly sensitive c processes in the sea otter. The project will characterize and co al expression of a suite of key genes that are indicators of immur nding of the status of recovery of sea otters in western Prince W	viled and unoiled areas of Prince William molecular techniques for the measurem ompare the genomic stress response in nological, cellular, and metabolic respons illiam Sound, and physiological factors th	Sound for a ent of heall peripheral t ses to stres nat may be i	assessmer th status, to blood mono s. The res involved in	nt of CYP1A oxicant expo- onuclear cells ults of the st constraining	levels. This sure, and s by examin udy will ent recovery.	s ning the nance
02662	Natural Life Restoration by Manulipitation	J. Rusher/Rusher's Services	ADEC	New		\$103.0	\$0.0
This proj oil is in th accelerat	ect will place bait in pits of beaches and sensitive areas where w ne process of degrading by the movement of worms in the beach te the degradation of oil.	eathered oil may remain. Quality control . The toxicity of weathered oil will also b	testing of t e identified	the bait wo This bait	yr. project uld be done manulipitatio	to tell if wea on of worm:	athered s could
02663	"Watchdog Tool" for Sampling and Monitoring	J. Rusher/Rusher's Services	ADEC	New		\$180.9	\$0.0
testing of weathere Seabird/Fe	f the "Watchdog Tool" will be done to tell if weathered oil is leach ed oil. 	ing out or coming in from subtidal areas.	This proje	ct will also	identify the 1	toxicity of \$940.6	\$297.2
02144	Common Murre Population Monitoring	D. Roseneau/USFWS	DOI	Cont'd 7th yr., 7	\$14.0 yr. project	\$14.8	\$0.0
FY 02 wi of analyz murre po the spill a	Il provide close-out funds for this project, which will census the C ing the data collected during FY 01 and comparing these results opulation count data (e.g., from the Barren Islands), and writing a area.	hiswell Islands murre colonies during the with previous postspill population counts final report discussing the recovery state	e FY 01 field s, running a us of murre	d season. power ana s at this inj	The close-ou alysis using t ured nesting	ut work will hese and o location ar	consist ther nd in
02159	Surveys to Monitor Marine Bird Abundance in Prince Willian Sound During Winter and Summer 2002	n D. Irons/USFWS	DOI	Cont'd 9th yr.		\$194.1	\$25.0
This proj previous from sum ducks and murres a througho	ect will conduct small boat surveys to monitor abundance of mar surveys have monitored population trends for 65 bird and 8 mari nmer 1989-2002 and winter 1990-2002. Data collected in 2000 in e increasing in the oiled area in winter, and black oystercatchers are showing no trend in the oiled area; pigeon guillemots and mar ut the sound. Results of these surveys through 1998 have been	ine birds and sea otters in Prince William ine mammal species in the sound. Data ndicate that bald eagles are increasing ir are increasing thoughout the sound in s bled murrelets are declining in the oiled published by Irons et al. (2000) and Lan	a Sound dua collected ir a winter and ummer. Co areas of the ce et al. (20	ring March n 2002 will I summer t ommon loo e sound an 001). [Note	and July 200 be used to e hroughout th ns, cormorar d Kittlitz's mi e: This project	02. Seven xamine trea le sound, h hts, and cou urrelet is de ct also requ	nds arlequin mmon eclining iested

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02163-BAA	Alaska Predator Ecosystem Experiment in Prince William Sound and the Gulf of Alaska (APEX)	D. Duffy/Paumanok Solutions	NOAA	Cont'd 9th yr., 9	\$20.0 yr. project	\$31.1	\$0.0
This projec Inlet, comp calibrate so from the oi	ct will fund a third closeout year for Project /163, which used se baring their reproductive and foraging biologies, including diet. eabird performance with fish distribution and abundance. This il spill. In FY 02, the project leader will prepare a semi-popular	eabirds as probes of the trophic (foraging) These measurements were compared w a allowed a determination that food played account of the results and implications o) environme rith hydroac I a major ro f the projec	ent of Princ coustic, aer ble in limitin ct.	e William So ial, and net s g the recove	ound and C ampling of ry of seabi	ook fish to rds
0216 3 M	Numerical and Functional Response of Seabirds to Fluctuations in Forage Fish Density	J. Piatt/USGS	DOI	Cont'd 9th yr., 9	\$0.0 yr. project	\$82.5	\$0.0
This projec data on se oceanogra	ct will fund preparation of synthesis manuscripts for this compo abird survival and stress continuing in 2000-2001. The work aphy, while measuring aspects of seabird breeding biology and	onent of the APEX project. The main field involved at-sea surveys for forage fish and foraging behavior at adjacent colonies.	l program o d seabirds	and some	1995-1999, characteriza	with collec tion of	tion of
02434	Design of a Video System for Remotely Monitoring Seabiro East Amatuli Island	is at A. Kettle/USFWS	DOI	New 1st yr., 2	yr. project	\$4.3	\$1.1
During the is possible to the Eas design req	e 1990's, rough seas at East Amatuli Island have occasionally to that in the future weather patterns could compromise dataset t Amatuli field camp. This could augment field observations an quirements for such a system, research and price available cor	blocked access to cliff plots where seabird s. Recently developed technology makes and allow safe data collection to continue the mponents, and determine the price for cor	d breeding s it possible hrough peri htractual sy	and popula to transmi iods of roug stem desig	tion size data t video imag h seas. Thi n and assen	a are collec es of the ci s project w nbly.	sted; it iff plots ⁄ill
02479	Effects of Food Stress on Survival and Reproductive Performance of Seabirds	J. Piatt/USGS-BRD, A. Kitaysky/Univ. of Washington	DOI	Cont'd 4th yr., 4	\$75.0 yr. project	\$75.0	\$0.0
Traditional project will hormones restraint. unique opp	I field methods of assessing effects of fluctuations in food support I apply an additional tool the measure of stress hormones in such as corticosterone in the blood of seabirds, or the rise in the These techniques will be applied to seabirds breeding in lower portunity for a concurrent field and captive study of stress in se	bly on the survival and reproductive perfor free-ranging seabirds. Food stress can be blood levels of corticosterone in response Cook Inlet and captive birds will be used eabirds.	mance of so oe quantifie to a stand for controll	seabirds ma d by measu ardized stre led experim	ay give equiv uring base le essor capti ients. This p	vocal result vels of stre ure, handlin project prov	s. This ss ng and vides a
02561	Evaluating the Feasibility of Developing a Community- Bas Forage Fish Sampling Project for GEM	ed D. Roseneau/USFWS	DOI	New 1st yr., 2	yr. project	\$54.3	\$11.6
This project population help assest are favoration	ct is based on the recently completed APEX project's 5-year pi is. The project will monitor long-term trends in forage fish pop as and understand the types and levels of community participa ble, the information can be used to begin designing cost-effect	lot study that used stomach contents from ulations in several regions of the spill area tion that may be available for long-term fo tive, community-based forage fish monitor	n sport-cau a during GE prage fish n ring studies	ight halibut EM. The pr nonitoring s	to sample fo oject will pro tudies. Also	orage fish vide inform , if project ds in cape	nation to results lin and

are favorable, the information can be used to begin designing cost-effective, community-based forage fish monitoring studies to track long-term trends sand lance stocks in the Kachemak Bay/lower Cook Inlet, Resurrection Bay, Kodiak Island, and Prince William Sound regions.

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Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02634	Expanding the Seabird Tissue Archival and Monito (STAMP) Program for GEM	ring Project D Y). Roseneau/USFWS, G. ′ork/BRD, P. Becker/NIST	DOI	New 1st yr., 1	yr. project	\$54.9	\$0.0
This project local comm logistical p long-term	ct will lay the ground work for expanding the Seabird T munity networks for collecting samples for the project, plans for expanding STAMP in the Gulf of Alaska, and monitoring plan for GEM.	issue Archival an adding more seal completing analyt	d Monitoring Project (STAMP) in bird colony locations and species ical work on existing samples to p	the spill ar to the exis provide a c	ea. The pr ting STAM latabase th	oject will inc P program, at will be us	lude develo developing ed to desig	oping n a
02659	Preparation and Publication of Results from SEA a Avian Predation Studies	nd NVP M	1. Bishop/ PWSSC	NOAA	New 1st yr., 1	yr. project	\$29.7	\$0.0
This project work from publication	ct will prepare (a) two manuscripts based on the work the Avian Predation on Blue Mussels study (Project // n on avian consumption of herring spawn is currently in	from the Avian Pr 25). The three m press in <i>Fisherie</i>	redation on Herring Spawn study nanuscripts will be submitted to po es Oceanography.	(Project /3: eer reviewo	20) and (b) ed journals	one manus for publicati	cript based on. One	on the
02664	Retrospective Analysis of 30 Years of Seabird Dist	ribution and J	. Piatt/USGS	DOI	New 1st vr 3	vr. project	\$287.6	\$230.0
Seabirds a in Alaska I will compil foundation also reque	are excellent indicators of change in the marine enviro have been gathered at great expense over the past 30 le some historical seabird data sets and create access n for future studies, and to test some basic hypotheses ested funding (\$120,000) for FY 04.]	nment. An enorm years, but most of ible data archives about the effects	nous amount of data on the abund of it has not been analyzed beyon as a tool for assessing past and of regime shifts on diet and distr	dance, dist d the scale future hur ibution of s	ribution and at which in an impact seabirds in	d dietary hal t was gather s on seabiro Alaska. [No	pitats of ser red. This p ds population ote: This pr	abirds roject ons, a oject
02673	Continuing Decline of Pigeon Guillemots in the Oil Prince William Sound	ed Portion of E). Irons/USFWS, D. Roby/OSU	DOI	New 1st yr., 5	yr. project	\$28.7	\$29.5
Pigeon gu together p guillemots predation, requested	illemots have declined 56% in Prince William Sound s igeon guillemots have declined 88% since 1972, and t in Prince William Sound. From previous work we sus or continuing oil effects. The first year the study will for funding for FY 04 (\$30,500), FY 05 (\$31,500), and FY	ince the <i>Exxon Va</i> he decline is cont pect one or more ocus on food and 06 (\$32,500).]	aldez oil spill. This is compounde inuing. This project will investiga of three major factors are causir predation, as analyses for oil effe	d on a 739 te factors f ig the decli ects is mor	% decline fr hat are cau ine: reduce e expensiv	rom 1972 to using the co d prey base e. [Note: Thi	1989. Tak ntinued dec , increased is project a	en xline of Iso
02674-BAA	Assessing Pigeon Guillemot Restoration Techniqu Feathers as Biomonitors	es and J C	. French/Pegasus Enterprises, G Divoky/UAF	. NOAA	New 1st yr., 2	yr. project	\$83.6	
This project feathers as Center will gulf will be web will be	ct will (a) monitor pigeon guillemot restoration projects s indicators of ecosystem variability and contamination I be conducted and the occupancy and success of arti e visited to assess the reason for their attractiveness to e examined through isotopic and trace metal analysis	initiated between a. Censuses of R ficial nest sites en guillemots. Tem of recently collected	1998-2000 and (b) conduct a pro esurrection Bay to determine sur ected in the Gulf of Alaska will be poral and geographical variation ed pigeon guillemot feathers.	eliminary e vivorship o monitorec in the strue	xamination f birds fled l. Establist cture and c	of the utility ged form the ned man-ma ontaminatio	v of guillem e Alaska Se ade colonie n of the gui	ot eaLife s in the if food

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
Archaeolog	ical Resources				\$29.1	\$29.1	
02154	Archaeological Repository, Display Facilities, and Exhibits for Prince William Sound and Lower Cook Inlet	r J. Bittner/ADNR	ADNR	Cont'd	\$29.1	\$29.1	
In January Iower Coo Council's i managem	y 1999, the Trustee Council authorized \$2.8 million for a grant to k Inlet, local display areas in seven communities in those regions intent to provide a reasonable amount of funding for project man ent and GA funds for FY 02. [Detailed Project Description and b	Chugachmiut, Inc. to develop an archae s, and traveling exhibits to display in the agement and agency general administra oudget not yet provided; expected FY 02	eological re local facilit ation (GA). cost is \$29	pository for ies. The re This proje 3,100.]	r Prince Willi esolution also ct will provid	am Sound o states the e project	and 3
Subsistence	e				\$419.1	\$1,468.7	\$772.1
02052	Community Involvement Planning for GEM	P. Brown- Schwalenberg/CRRC	ADFG	Cont'd 8th yr., 8	\$180.0 yr. project	\$241.2	\$0.0
In FY 02, Kodiak Isl project wil three obje program,	this project will continue to actively involve residents of Tatitlek, (and Region/Ouzinkie, and the Alaska Peninsula Region/Chignik II work to address the future of community involvement with rega actives: (a) designing a community based research and monitorin and (c) developing possible pilot projects for FY 03.	Chenega Bay, Port Graham, Nanwalek, Lake in the restoration program through rd to the Gulf Ecosystem Monitoring (G g program, (b) identifying specific resea	Cordova/E a a network EM) progra arch and mo	yak, Sewar of local fac m. In FY 0 onitoring ac	d/Qutekcak, cilitators. In 2, the projec ctivities that f	Seldovia, addition, th at will focus it within the	Valdez, e on ≩ GEM
02210	Youth Area Watch	R. DeLorenzo/Chugach School District	ADFG	Cont'd 7th yr., 7	\$96.3 yr. project	\$96.8	\$0.0
This proje restoration principal ii plan and i Seldovia,	ect links students in the oil spill impacted area with research and in in process and provides these individuals the skills to participate in nvestigators who have indicated interest in working with students is a positive community investment in that process. Participating Seward, Valdez, and Whittier.	monitoring projects funded by the Trusto in restoration now and in the future. You . Youth Area Watch fosters long-term of communities in FY 02 will be Tatitlek, C	ee Council. uth conduct commitmer chenega Ba	The proje t research i it to the goa ay, Cordova	ct involves s dentified and als set out in a, Nanwalek,	tudents in delegated the restora Port Grah	he I by ation am,
02247	Kametolook River Coho Salmon Subsistence Project	J. McCullough, L. Scarbrough/ADFG	ADFG	Cont'd 6th yr., 6	\$28.0 yr. project	\$34.0	\$0.0
Subsisten the oil spil will provid boxes wer into the Ka investigate	ce users from the Alaska Peninsula Native Village of Perryville h II. Criminal settlement funds were used in FY 96 to determine wh e funding through FY 02 for the Alaska Department of Fish and 0 re installed in the upper reach of the Kametolook River. In 1998, ametolook River system, the project will be unable to achieve the e nearby coho stocks as potential brood sources for rehabilitation	ave noted significant declines in the connat method would best restore the river's Game to try conservative and safe restor 1999, and 2000 holding pens were also goal of restoration within two life cycles n of the Kametolook coho run.	no salmon r s coho saln ration meth o used. Du s of the fish	run in the n non stock to nods. In 19 e to continu . In FY 01,	earby Kame o historic lev 197, two instr ual low esca , the project	tolook Rive els. This p eam incub pement of will expance	r since roject ation coho to



Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02256B	Sockeye Salmon Stocking at Solf Lake	D. Gillikin/USFS	USFS	Cont'd 7th yr., 7	\$20.0 yr. project	\$20.0	\$4.5
This proje Solf Lake access to reconstruc evaluate t	ct will benefit subsistence users of western Prince to support a sustainable population of sockeye sal the lake for returning adult salmon. The stocking p ction of the fishway in the eastern channel was com he improvements. [Note: This project, originally so	William Sound. There are two phases to the project. mon. Phase 2 included stocking the lake with approxi- program began in 1998 along with modification to the npleted in the summer of 2000. Returning adult salmo- cheduled to closeout in FY 02, is now requesting fund	Phase 1, w mately 100 two outlets on to Solf L s in FY 03	/hich bega),000 sock to control ake will be (\$4,500).]	n in FY 96, v eye salmon f water levels. monitored s	erified the a ry, then en The tarting in 2	ability of suring 001 to
02333	Sea Otter Monitoring	B. Henrichs/Native Village of Eyal	DOI	New		\$100.0	\$100.0
				1st yr., 5	yr. project		
The sea o some mor Descriptio	tters in Orca Inlet have been dying and washing up hitoring to find a way to prevent these needless dea n and budget will need to be prepared. Funding (\$	o on the beaches the past few years. The problem is aths. [Note: This proposal was submitted as an idea; 3100,000 each year) has also been requested for FY 0	getting wor if recomm 4, FY 05, a	se. We kr ended for f and FY 06.	now the caus funding, a De .]	e. We nee etailed Proj	d to do ect
02372	Steller Sea Lion Monitoring	B. Henrichs/Native Village of Eya	(DOI	New		\$250.0	\$250.0
				1st yr., 5	5 yr. project		
Steller sea will be cur fund this i Funding (a lions are on the decline and have been placed on tailed and some traditional areas may be closed. A nteraction. [Note: This proposal was submitted as \$250,000 each year) has also been requested for F	the endangered list. If this trend continues, subsister We need to monitor the interaction between the Stelle an idea; if recommended for funding, a Detailed Proje FY 04, FY 05, and FY 06.]	nce fishing r sea lion a ect Descrip	for salmon and the fish tion and bu	n, herring and ning fleets. T udget will nee	d other ma his propos ed to be pro	ine life al would pared.
02401	Assessment of Spot Shrimp Abundance in Prir Sound	nce William C. Hughey/ Valdez Native Tribe, C O'Clair/ NOAA	C. NOAA	Cont'd 4th yr., 4	\$33.0 yr. project \$	\$27.2	\$0.0
This proje Alaska De Departme taken plac greater in Fish and (ct is estimating the abundance of spot shrimp and epartment of Fish and Game surveys to determine nt of Fish and Game in 1999 and 2000 indicate a c be between 1992 to 1998, and a slight increase in t 2000. FY 02 will fund close out, produce manuscr Game.	determining the structure of the spot shrimp population whether the spot shrimp population is recovering from cessation in the apparent decline of spot shrimp abund he number and weight of spot shrimp per pot in 1999 ipts, and provide input into the development of a shrim	n in Prince depletion. lance in we compared np manage	e William S Project re estern Prin to 1998. T ement plan	ound. It aug esults and th ice William S The increase with the Ala	iments curr ose of the cound that i was marke ska Depart	ent Alaska ad edly ment of
02416	O'Brian Creek Enhancement	Chenega Bay IRA Council	USFS	New		\$64.2	\$0.0
				1st yr., 1	yr. project		
Currently the numer series of c cutthroat t recreation	several stream habitat constraints exist within O'Br rous fish species that use the habitat as well as the lam and fish ladder structures. Species that popul rout. A self-sustaining limited subsistence use fish	ian Creek which is located near the village of Cheneg e entire local ecosystem. The main goal of the project ate the stream include pink salmon, chum salmon, co nery would be priceless for the community, as well as	a Bay. Imp is to increa ho salmon adding pote	provement ase the de , sockeye ential for p	s to the strea pth of water I salmon, Dolly romoting tou	am would b by creation y Varden, a rism and	enefit of a ınd

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02503	Orca Inlet Restoration	B. Henrichs/Native Village of Eyak	DOI	New 1st yr., 5	yr. project	\$100.0	\$150.0
Orca Inlet supplied w the inlet co were child Funding (\$	has become barren over the years. Wery little. The 1964 earthquake raising ombined with the increase of fish wasteren. [Note: This proposal was submittes 150,000 each year) has also been received.	hile it used to supply many of the subsistence resources to the resi the area resulted in a die-off of clams and crab. The expanding of dumped has resulted in a dead bay. We need to come up with a ed as an idea; if recommended for funding, a Detailed Project Desc uested for FY 04, FY 05, and FY 06.]	idents of the sea of plan to re cription ar	Eyak/Cord otters acce store Ocra nd budget v	ova, in recer lerated this. I Inlet to wha will need to b	t years it h The shallo t it was whe e prepared	as owing of en we
02507	Nuchek Subsistence Camp	B. Henrichs/Native Village of Eyak	DOI	New	vr. project	\$125.0	\$0.0
As a result foods. A s Nuchek. A [Note: This	t of the oil spill the availability of subsis subsistence camp at Nuchek would all As Chugach Alaska Corporation has b s proposal was submitted as an idea;	tence foods have changed. The residents of the spill region are sp we the youth and elders to address these changes. Many of the pe all a facility at Nuchek and holds annual spirit camps, this would be recommended for funding, a Detailed Project Description and bud	ending m ople in th an appro get will no	ore time g e region tra priate loca eed to be p	athering trad ace their and ation for this prepared.]	itional sub: estry back subsistence	sistence to e camp
02610	Kodiak Archipelago Youth Area W	tch T. Schneider/Kodiak Island Borough School District	ADFG	Cont'd 3rd yr., 3	\$61.8 3 yr. project	\$128.3	\$57.7
This project interviews and studer to learn at knowledge	ct will engage students in projects with with local experts and document tradi nts in the annual Academy of Elders/S pout restoration efforts, scientific monit e will be strongly emphasized through	goals aligned with the general restoration efforts of the Trustee Co ional ecological knowledge, publishing it in a District oral history ma cience Camp will be strongly recommended. Such participation will pring techniques, and occupations related to such work. The value ut the implementation of the project.	uncil, Sta agazine. I serve as and imp	udents and Participations another a lications of	I site coordin on of Youth A venue for ma traditional e	ators will c area Watch ore tribal m cological	onduct adults embers
02669	Hooligan Research	B. Henrichs/Native Village of Eyak	DOI	New	ur project	\$100.0	\$100.0
The Alaska tell us what have been commerciat harvest an Project De	a Department of Fish and Game has to at the biomass is. Hooligan are a tradi in no commercial herring openers in year al fishery on herring resulted in a deple ad still maintain the stocks for tradition escription and budget will need to be pla	een selling permits to harvest hooligan commercially for the past two onal subsistence food and a forage food for birds, fishes and marin rs, because they have been over fished. It doesn't make sense to tion of those stocks. This project proposes independent research of I subsistence harvest. [Note: This proposal was submitted as an ic epared.]	vo years. ne mamn start a co on hooliga dea; if rec	We are con mals, incluc ommercial an to see in commende	ncerned be ling Steller se fishery on ho f it can susta d for funding	cause they ea lions. T oligan, who in a commo , a Detaileo	cannot here en the ercial t



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Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02677	English Bay River Sockeye Salmon Enumeration Project		C. Kvasnikoff/Nanwalek IRA Council	ADFG	New 1st yr., 2	yr. project	\$182.0	\$109.9
This project scarce and returns. T Fish and G equipment	ct will allow for improvements to and continuation of smolt and d the Nanwalek Salmon Enhancement Project has been forced he enumeration of out-migrating smolts and returning adult so Same area management staff but without additional funding, the t and monitoring technology to enable more consistent and acc	adult s d to nai ckeye iese im curate o	ockeye enumeration in the English row its focus to absolutely essentia escapement is very important to vill portant tasks will not be able to con data collection.	Bay River I compone age projec tinue. Thi	drainage. nts of the p t personne s project w	Available fur project that re I and Alaska ill help to imp	nds have b esult in adu Departme prove the v	ecome ult nt of veir
Habitat Imp	rovement						\$185.6	\$0.0
02612	Detecting and Understanding Marine-Terrestrial Linkages in Kenai River Watershed	n the	W. Hauser/ADFG	ADFG	New 1st yr., 1	yr. project	\$44.6	\$0.0
terrestrial salmon an anthropog be cascad salmon are	nutrient cycling in the Kenai River watershed. The oil spill curta ad other species, in addition to allowing a massive input of mari enic activities including habitat degradation, increased utilizatio ing impacts when marine derived nutrients normally supplied b e withdrawn, productivity of the entire watershed is expected to	ailed c ine nut on and oy salm o be dir	invasive species. Studies on wate non carcasses are diverted from an minished.	annsts tha 39, causin non. The v rsheds of ecosysten	g changes vatershed i the Pacific n. When n	in productivi is also at sor Northwest su utrients norm	ties of sock ne risk fror uggest the nally suppli	keye n re may ed by
02621	Kenai River Flats Conservation Easement and Public Educ	ation	M. Kuwada/ADFG	ADFG	New 1st vr 1	vr project	\$141.0	\$0.0
This project property and educationat a North And development boardwalk	ct will protect approximately 600 acres of wetlands on the Kena nd construction of a boardwalk will protect sensitive coastal we al and recreational opportunities for the public. The conservation nerican Wetland Conservation Act grant. The easement will sp ent. A boardwalk and viewing platform will be constructed usin and viewing platform are essential for obtaining the City's supp	al Rive etlands on eas pecify ng EVC port fo	r Flats near the city of Kenai. The a , high value waterfowl habitat, and t ement will be purchased by the Cor that the property be preserved in a PS funds to proved recreational birdy r the conservation easement.	acquisition wo anadro nservation natural sta watching a	of a conse mous fish Fund using te and prot nd educati	rvation ease streams, and g already-ap ected agains onal opportu	ment for th d will provid proved fun st incompa nities. The	e de new ds from tible e
Habitat Prot	lection			-				
02126	Habitat Protection and Acquisition Support	rocolui	ng title to perceive conviced by the Tr	rueteo Cor	Cont'd	t This proje	ot will bo f	inded
outside of	the regular FY 02 work plan of research, monitoring, and gene	eral res	toration projects. Detailed Project I	Description	and budg	et not yet pro	ovided.]	

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
Ecosystem	Synthesis/GEM Transition	n. n <u>. a </u>			\$340.0	\$3,025.2	\$813.0
02340	Toward Long-Term Oceanographic Monitoring of the Gu Alaska Ecosystem	If of T. Weingartner/ UAF	ADFG	Cont'd 5th yr.,	\$0.0 4 yr. project	\$20.7	\$0.0
FY 02 will the GAK 1 manuscrip efforts incl	fund completion of the final report for this multi-year project. I mooring is to be continued under the GEM program). After of will focus on freshwater variations on the Gulf of Alaska sh luded in previous annual reports.	The fourth year of measurements will be co completion of the data collection phase, a fin relf, and will synthesize the data collected und	ompleted in nal report a der this pro	Septem and manu oject with	ber 2001 (or D uscript will be p some of the re	ecember 2 prepared, etrospectiv	2001 if The e
02360-BAA	The Exxon Valdez Oil Spill: Guidance for Future Resear Activities	C. Elfring/Polar Research Board, NRC	NOAA	Cont'd 3rd yr.,	\$90.0 3 yr. project	\$90.1	\$0.0
scope, cor Monitoring draft Rese missions, The comm the expect in June an expected t	ntent, and structure of the Trustee Council's two GEM (Gulf g Plan. To date, the committee has provided guidance in two earch & Monitoring Plan would be developed and a February goals, administration, scale, data management, and commu- nittee's next and final task will be to prepare a final report an atations of the Trustee Council. This task will be conducted w and hold a meeting to begin our review June 14-15, 2001. The to go to outside review in November 2001 and be delivered to	Ecosystem Monitoring) documents, the draft documents: a November 2000 letter comme 2001 Interim Report providing detailed comme inity involvement elements. alyzing whether the Research and Monitoring when the draft plan is available for review. As a committee will spend the summer and early to the Trustee Council in January 2002.	Science F enting on the ments on t g Plan is co s currently y fall prepa	rogram a ne sched he draft s omplete, schedule iring its fi	and the draft R ule and proces ocience progra scientifically so d, we will rece nal report. Th	esearch ar ss by which m, includin ound, and i live the dra e report is	nd 1 the 9 meets aft plan
02455	Gulf Ecosystem Monitoring and Research Program Data System	Restoration Office	ADFG	Cont'd 2nd yr.	\$150.0	\$150.0	
This proje developing expected l	ect will continue work on the data system for GEM. Funding g this essential part of the GEM program; hiring is expected FY 02 cost is \$150,000.]	was provided in FY 01 to hire a data system to occur in late spring 2001. [Note: Detailed	manager t d Project D	o provide escriptio	the leadership n and budget r	o necessar not yet prov	y for /ided;
024 7 5-BAA	GEM Data System Specification	S. Marley	NOAA	New		\$250.9	\$0.0
				1st yr.,	1 yr. project		
This project already pe for Propos	ect will produce the Operations Concept and Systems Requir- erformed, and through a detailed requirements definition app sal (RFP) for the permanent system.	ements Specification for the data system for roach, we will be able to develop the detailed	GEM. Thi description	s project in necess	will capitalize sary to release	on the wor a formal F	k Req uest

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02536	Synthesis of Spill Damaged Resource Information into the Heritage Data Management System	T. Gotthardt, K. Boggs/UAA	ADFG	New 1st yr., 1	yr. project	\$118.2	
This proje (HDMS). terrestrial resources using HDI	ect will synthesize conservation information pertaining to species a HDMS is part of an effort by The Nature Conservancy and 86 Nat and nearshore endangered species and ecosystems. It is the large information into HDMS would ensure linkage of EVOS information MS as an integral tool within GEM to track the recovery status of ir	nd ecosystems damaged by the oil spi tural Heritage Programs throughout the gest biodiversity conservation effort of in to broader based conservation effort njured resources.	II into the H Western I its kind. Th s. The pro	leritage Da Hemispher ne incorpor ject will als	ta Managem e to docume ation of spill o evaluate th	ent Systen nt informati affected ne effective	ו on on ness of
02584	Evaluation of Airborne Remote Sensing Tools for GEM Monitoring	E. Brown/UAF, J. Churnside/NOA	A ADFG	New 1st yr., 3	yr. project	\$118.4	\$240.0
This proje package o AVHRR), infrared d The FY 04	ect will evaluate airborne remote sensing tools for GEM monitoring consists of (a) a pulsed lidar to map subsurface biological features (c) two three-chip digital video systems to map ocean color (chlor ligital video to map birds and mammals at night. The project will u 4 cost (year 3 of the project) has not been provided.]	, including a biological/ecological inter s day to a maximum of 50 m, (b) an inf ophyll), birds, mammals, surface fish s se shipboard and buoy data for valuda	pretation of rared radio schools, and tion and inf	the data c meter to m d ocean fro terpretation	ollected. Th ap SST day ontal structur of remote s	e instrume (similar to e, and (d) a ensed data	nt an a. [Note:
02597-BAA	Ocean Color Time Series of Prince William Sound	S. Pegau/ OSU	NOAA	New 1st vr 1	vr. project	\$28.5	\$0.0
This proje of the coa state of th extent of t seasonall	ect will develop a time series of chlorophyll concentrations and othe astal waters of Alaska and Prince William Sound in particular. Sea ne art algorithms. The data will be mapped into regional areas at 1 the time series will be examined. This data set will allow investiga ly, and annually during the life of these missions.	er ocean color products for general us aWiFS data collected at University of A I km resolution. The possibility of addir tors to examine how the base of the fo	e. The time laska-Fairb ng CZCS a od chain (p	e series wil banks will b nd OCTS c bhytoplankt	l include full e processed lata to increa on) has varie	resolution i with the cu ase the tem ed monthly.	mages urrent poral
02600	Synthesis of the Ecological Findings from the EVOS Damage Assessment and Restoration Programs, 1989-2001	R. Spies/EVOS Chief Scientist, e al	t ADNR	New 1st yr., 2	yr. project	\$151.6	\$324.9
This proje anthropog manuscrip EVOS res	ect will synthesize the significant results from 12 years of post-spill genic and natural forcing factors influencing the northern Gulf of Al pts that will either be submitted to a journal for publication as a wheteration program and help set the foundation for GEM.	study in the EVOS damage assessme aska. The results of the synthesis will ole volume, or to a publisher as a bool	ent and rest be incorpo <. This effo	oration pro rated into a ort will be o	grams as the series of in ne of the ma	ey relate to terrelated jor product	s of the
02604	Gear Selectivity in Trawl Surveys along the Northern Gulf of Alaska	W. Bechtol/ADFG	ADFG	New 1st vr 2	vr. project	\$52.1	\$15.0
This proje conditions One surve series, da compositie	ect will explore approaches to developing long-term monitoring tech s and changes in the northern Gulf of Alaska. Time series data an ey series dates to the 1970's and uses a small-mesh trawl that cat ting to 1990, uses a larger-mesh trawl fished closer to the bottom on time series from these two survey types will allow determination	hniques for forage fish populations in 0 e available for two different trawl surve ches species representative of the uno and catching substantially different sp n of gear selectivity between these trav	Cook Inlet, ys conduct lerlying fora ecies comp vls.	an area rep ed in Kach age base in position. Co	oresentative emak Bay in h this area. T omparison o	of ecosyste lower Coo The second f the catch	⊧m k Inlet. ∣survey

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02609	Long-Term Temperature/Salinity Monitoring Within the Alaska Coastal Current	T. Weingartner/UAF	ADFG	New 1st yr., 2	yr. project	\$59 . 8	\$15.5
Interannual marine eco near Sewar interannual suggested a	variations in temperature, salinity, and their vertical distribution on system. This variability needs to be quantified and understood bas rd. This project maintains this time series and will continue to quan variations in near-surface (upper 10 m) stratification and the timing as being an important component to the development of the GEM p	the northern Gulf of Alaska she ed on extended time series suc tify the variability and understar of the spring bloom on the inn program.	elf reflect enviror ch as the 30-yea nd the sources o er shelf. The da	nmental cha ar record at of it. It will a ata and ass	anges that m hydrographi also begin to ociated ana	hight affect ic station G document lyses are	this AK1
02614	Monitoring Program for Near-Surface Temperature, Salinity, and Fluorescence in the Northern Pacific Ocean	S. Okkonen/UAF	ADFG	New 1st yr., 2	yr. project	\$38.2	\$17.1
This projec temperature	t will use a thermosalinograph and fluorometer, to be installed on a e, salinity, and fluorescence fields along the tanker route between \	crude oil tanker, to acquire cor /aldez, Alaska and Long Beach	ntinuous, long-te n, California.	erm measui	rements of th	ne near-sui	face
02618-BAA	Measurements of Tide Rip Front Variability in Cook Inlet	S. Saupe/CIRCAC	NOAA	New 1st yr., 2	yr. project	\$11.7	\$3.7
This projec location and	t will use a vessel-mounted thermosalinograph to acquire long-term d intensity of tide rip fronts in Cook Inlet.	n measurements of near-surfac	e temperature a	and salinity	to identify va	ariability in	ihe
02622	Digital Maps from Existing Seasonal Environmental Sensitive Area Maps: Cook Inlet/ Kenai Peninsula	J. Whitney/ NOAA	NOAA	New 1st yr., 1	yr. project	\$36.6	\$0.0
A series of Peninsula r Division in for digital p four-tiered Prince Willi	national standardized digital map products will be produced form the made by NOAA in 1994. A four map seasonal series was originally the ArcInfo digital format with the output and distribution primarily b roducts, NOAA's digital ESI products have greatly expanded. This nationally standardized set of digital map products with the delivera- iam Sound under Project 99368.	ne existing seasonal environme developed for Cook Inlet by the eing poster maps at a scale of project will transform the existin ble being 100 CD's. These will	ntal sensitive in e NOAA Hazard 1:450,000. Sind ng Cook Inlet/ K be the same pr	dex (ESI) n ous Materi e then, cor enai Penin oducts that	naps for Coo als Respons mbined with sula digital d t were recen	ok Inlet/ Ke e and Asse greater de lata into a tly provideo	nai ssment mand d for
02624-BAA	A CPR-Based Plankton Survey Using Ships of Opportunity to Monitor the Gulf of Alaska	S. Batten/SAHFOS, D. Welch/DFOC	NOAA	New 1st yr., 1	yr. project	\$133.4	\$0.0
This projec marine food atmosphere valuable ma monitoring Council's lo	t presents the rationale for developing a plankton monitoring progra d chain whose dynamics are poorly understood, but respond rapidly e and valuable upper trophic level populations, such as salmon, her arine resources in the Gulf of Alaska are strongly influenced by cha and this project will build on recent experience gained with the CPF ong-term research program).	am for the Gulf of Alaska using y and unambiguously to climate rring, shrimp, and groundfish. T inges in ocean climate. Ships o R (continuous plankton recorder	ships of opportu change and for The proposal re of opportunity ar rs) in the North I	unity. Plank m the link l views the e e a cost eff Pacific to p	kton are a cr between cha vidençe that fective platfo repare for G	itical link in inges in the many of th irm for larg EM (the Tr	the e most e scale ustee

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02627-BAA	A Symbiotic Acoustic Signal Processor to Increase Stock Assessment Effort	J. Dawson/BioSonics, Inc.	NOAA	New 1st yr., 1	yr. project	\$171.0	\$0.0
This project shipboard of geo-referent abundance does not re	ot will develop a Symbiotic Acoustic Signal Processor (SASP) secho sounder and routes the output over an Ethernet connection need raw digital acoustic data in an established scientific formate and distribution of stocks within the sampled areas. The desirequire dry-dock installation or towing of an underwater transducted areas are stocks.	ystem, consisting of a high resolution on to displays, storage, and processing at to PC hard disk. The data collected gn philosophy provides a low-cost sys cer sled, and does not effect the opera	digital sonar r g systems. T and analyzed em that is ex tion of the cu	eceiver tha his system I using this tremely sin rrently insta	t attaches to provides the system can ople for a ski illed echo so	an existing capability determine pper to ope under.	g to store erate,
02628-BAA	Resurrection Bay Contaminant Survey	P. Homan/ Qutekcak Native Tr	ibe NOAA	New 1st yr., 2	yr. project	\$128.8	\$9. ⁻
Qutekcak N	Native Tribe would like to lead the way in protecting Resurrection	on Bay from pollution and misuse. Imi	nediate sour	ces of pollu	tion in the ba	iy include li	ndustry,
collect twee Persistent	vastewater treatment discharge, leaky septic systems, boat had nty ocean floor sediment samples from Resurrection Bay and a Organic Pollutants. The results of the analyses will be publiciz	bor, coal terminal, and large ships suc analyze them for contaminants includir ed via public meetings, reports, and a	in as barges, ig metals, col website.	iform bacte	ria, pesticide	es, and oth	er
Collect twee Persistent	vastewater treatment discharge, leaky septic systems, boat had nty ocean floor sediment samples from Resurrection Bay and a Organic Pollutants. The results of the analyses will be publiciz Development of a Paradigm for Ecosystem Monitoring	nor, coal terminal, and large ships suc analyze them for contaminants includir ed via public meetings, reports, and a R. Thorne/PWSSC	ig metals, col website. NOAA	New 1st yr., 1	vr. project	s. This pro- es, and oth \$95.0	er
Collect tweir Persistent 02629-BAA This project recommen methods id individual-or Ecosystem	vastewater treatment discharge, leaky septic systems, boat has nty ocean floor sediment samples from Resurrection Bay and a Organic Pollutants. The results of the analyses will be publiciz Development of a Paradigm for Ecosystem Monitoring ct will evaluate the GEM draft plan and draft recommendations ided a list of modifications to GEM. However, we believe that th dentified by GLOBEC planners in the early 1990's, such as the organism approach and more. Our experience with programs in Assessment addressed these issues with some success.	to GEM that would improve research bey missed some potentially serious is limitations of measurement, correlatio of the Prince William Sound Science C	efficiency and sues regardir h-based analisenter, Oil Sp	New 1st yr., 1 focus. The g the limita yses, uncou	yr. project e National R tions to exis pled predict Institute an	s, and oth \$95.0 esearch Co ting scienc ion-oberva d Sound	souncil er \$0.0 buncil e tion, the
02629-BAA This project recomment methods id individual-or Ecosystem	vastewater treatment discharge, leaky septic systems, boat has nty ocean floor sediment samples from Resurrection Bay and a Organic Pollutants. The results of the analyses will be publiciz Development of a Paradigm for Ecosystem Monitoring ct will evaluate the GEM draft plan and draft recommendations ided a list of modifications to GEM. However, we believe that th dentified by GLOBEC planners in the early 1990's, such as the organism approach and more. Our experience with programs in Assessment addressed these issues with some success. Planning for Long-Term Monitoring and Research Program	The prince William Sound Science Contact Restoration Office	ALL	New 1st yr., 1 focus. The g the limita yses, uncou ill Recovery Cont'd	yr. project e National R tions to exis pled predict Institute an \$100.0	s, and oth \$95.0 esearch Co ting scienc ion-oberva d Sound \$100.0	souncil er tion, the
02629-BAA This project recomment methods id individual-oc Ecosystem 02630 In March 11 area and at and will con FY 01, follo Plan is und [Note: Detail	vastewater treatment discharge, leaky septic systems, boat has nty ocean floor sediment samples from Resurrection Bay and a Organic Pollutants. The results of the analyses will be publiciz Development of a Paradigm for Ecosystem Monitoring ct will evaluate the GEM draft plan and draft recommendations ided a list of modifications to GEM. However, we believe that th dentified by GLOBEC planners in the early 1990's, such as the organism approach and more. Our experience with programs in Assessment addressed these issues with some success. Planning for Long-Term Monitoring and Research Program 999, the Trustee Council earmarked an estimated \$120 million indjacent northern Gulf of Alaska. Development of what is now intinue through FY 02. In FY 00, a draft GEM Science Program ow-up on the National Research Council's recommendations of derway in FY 01 and will be completed in FY 02. This project is ailed Project Description and budget not yet provided; expecte	The prince William Sound Science C Restoration Office of Restoration Reserve funds for a lo called the Gulf Ecosystem Monitoring of the GEM Science Program is occurr accomplished through the combined d FY 02 cost is \$100,000.]	ALL ng-term moni and Research ng. Develop efforts of the	New 1st yr., 1 focus. The g the limita yses, uncou ill Recovery Cont'd toring and to (GEM) pro- lational Re ment of a d Restoration	yr. project e National Re titions to exis upled predict for Institute an \$100.0 research pro ogram was in search Coun raft Monitorin o Office and	s, and oth \$95.0 esearch Co ting scienc ion-oberva d Sound \$100.0 gram in the nitiated in F icil for revie ng and Res Chief Scien	spill search search search

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02636-BAA	Ecosystem Recovery Through a Partnership with Spill-Impacted Communities	n the K. Adams, B. Perrine, R. Mullins/Cordova	NOAA	New 1st yr., 1	yr. project		
The goal of successes realizing the risksto be common go	securing and sustaining the recovery of the marine of the Council's Restoration Plan, that goal is within e goal. In this regard, commercial fishing has the ir one of the most effective partners. This project w oal than is possible through the same investments of	e system is a first priority for the Trustee Council as w reach. The economies and the communities of the rvolvement, resources, and motivationthrough long rell develop a plan and demonstrate that a partnersh expended independently. [Note: Budget not provided	well as for t spill-impac g term finar ip can acco d.]	he spill-im cted region ncial positio omplish sig	pacted regio are the nations and com nificantly mo	n. Given th ural partner mitted fina ore toward o	ne rs for ncial our
0 263 7	Online Early Life History Database for the Northe Ocean, Gulf of Alaska and Southeast Bering Sea	ast Pacific J. Duffy-Anderson/NOAA	NOAA	New 1st vr. 2	vr. project	\$143.7	\$1.2
This projec and southe searchable managers a	t will develop a public, online, early life history databast Bering Sea. The database will merge sample of , internet-based database. This database will provi and other users access to accurate, relevant inform	base for more than 20 years of ichthyoplankton data collection information with a larval identification guide ide global access to these resources, providing a pla nation on ichthyoplankton distributions in Alaska.	from the ne and ichthy tform for th	ortheast Pa voplankton ne generati	acific Ocean distributiona on of hypoth	, Gulf of Ala I atlas into leses and c	aska, a offering
02640	High Frequency Surface Wave Radar Test in Pri Sound	ince William A. Kotlarov/Alaska Marine Technology Corp.	NOAA	New 1st yr., 2	yr. project	\$129.5	\$128.4
This projec technology sound's circ provide rea upwelling d	t will analyze surface currents in Prince William Sou will increase knowledge and understanding of the o culation obtained from models such as those develo I-time and archived data about ocean surface curre ynamics. The complete system will consist of two	und with a portable short-range, high-frequency surfa overall distribution of currents in the sound, and will a oped by Wang, Deleersnijder, Mooser and others. C ents in the sound. Observations will include current s radars that are capable of measuring current vectors	ace wave ra add signific Once deploy speed, curr s in real tim	adar system antly to exi yed and op rent direction re out to a comparison	m. Use of th isting inform perating, this on, diversion distance of f	iis advance ation about system wil flow and ifty miles.	ed the I
02643	Design of the Environmental Specimen Bank Pro	ogram for GEM P. Becker/NIST	DOI	New		\$85.4	\$0.0
This projec contaminar banking pro associated Native com	t will develop a design and implementation plan for its monitoring and research. This plan will provide btocols, recommendations on specimen sizes and f with GEM, recommendations on specimen access munities), and cost estimates for instituting and ma	an Environmental Specimen Bank component to GE organizational framework, facility requirements, iden frequency of collections, establishment of database r s policy, identification and development of collection aintaining an Environmental Specimen Bank system	EM specific atification of network wit platforms (i for GEM.	ally design specimen h other kin including p	ed for enviro s of interest ds of archive artnership w	onmental , collection al facilities rith local Ala	and ask a
02648-BAA	Cost Effective Data Acquisition Using Adaptive S Combining Information Strategies	Sampling and D. Dorsett/Baylor Univ.	NOÄA	New 1st vr., 2	vr. project	\$56.2	\$58.1
This projec used in GE of combinir	t will analyze data acquired in a pilot study of adapt M. Detailed adaptive sampling methods will be doo ng data from different sources will be determined ar	ive sampling by FOCI in 1999 to provide information cumented to enhance cost effective methods of data nd documented for further efficient data utilization.	for designi collection.	ing adaptiv In a seco	re sampling nd phase, si	methods to atistical me	be ethods

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-	Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
	02655-BAA	Transition Support for the GEM Data Manager	С	. Falkenberg/ECOlogic Corp.	NOAA	New 1st yr., 1	yr. project	\$120.3	\$0.0
:	This project a GEM data Project 0045	will support the GEM data manager during FY 02 in or system, the rescue of legacy EVOS data, and the inte 5, we anticipate that the data manager will set the fina	rder to ease the egration of the ac al priorities and s	transition to the GEM data syste Iministrative databases. Althoug select one or more of the tasks p	em. Tasks gh these ar proposed.	will address e the priorit	s the challer ies that hav	ge of form e emergeo	ulating from
-	02667	Effectiveness of Citizens' Environmental Monitoring I	Program S	. Mauger/Cook Inlet Keeper	ADEC	New		\$16. 7	\$0.0
_	This project commuinity- selection are (Kenai Wate future comm	will analyze five years of past data from Cook Inlet Ke based water quality monitoring program in Alaska. Ke effective at meeting the monitoring objectives of dete rshed Forum, Anchorage Waterways Council, Wasilla unity-based monitoring programs.	eper's Citizens' eeper's Stream E ecting significant a Soil and Water	Environmental Monitoring Progr Ecologist will determine if sampli changes in water quality over ti Conservation District) refine the	am, the firs ng frequen me. The re ir commur	et consisten cy, methode esults will as hity monitori	t, credible, a s, paramete ssist Cook Ir ng efforts ar	nd coordir rs, and site nlet Partne nd may lea	ated rs d to
-	02668	Developing an Interactive Water Quality and Habitat and Making it Accessible on the Web	Database J.	Cooper/Cook Inlet Keeper	ADEC	New 1st yr., 1	vr. project	\$15.0	\$0.0
	The project equally share stakeholders GIS watersh threats to, an	partners have come together to form a database comr e, report, and review their water quality and habitat da c, resource managers, and the public. The committee ed maps, photos, and graphs so that it is user-friendly and solutions for, water quality and habitat.	mittee to create ta. The commit will uplink a sha /, educational ar	a consistent data management tee's objective is to make data n ared interactive database on the id meaningful. Access to this da	system when nore acces Internet whata will help	ere all citize sible and m here it can t facilitate a	ens groups a ore useful to be viewed au better unde	nd agencie o decision nd queried rstanding a	es can makers, with about
-	02671-BAA	Coordinating Volunteer Vessels of Opportunity to Co Oceanographic Data in Kachemak Bay and Lower C	ollect D ook Inlet B	. Stram, C. Schoch/Kachemak ay Research Reserve	NOAA	New 1st yr., 1	yr. project	\$53.1	\$0.0
	Cook Inlet K community in Drift cards w These data w mixing patte	eeper and the Kachemak Bay Research Reserve will nvolvement. Instruments installed on charter boats wi ill be deployed seasonally at locations surrounding the vill also be correlated with existing stationary sensors rns and their relationships to the dispersal of larvae ar	coordinate the c ill be used to col e region. Collect and volunteer-m nd pollutants in t	ollection of oceanographic data lect time-series of temperature a ted data will be used to infer reg nonitoring projects to expand sp the region.	from ships and salinity ional water atial and te	of opportur from transe circulation mporal kno	nity and with acts along K and mixing wledge of w	extensive achemak l characteris ater quality	local Bay. stics. and
-	02678-BAA	Identifying Community-Based Ways to Use Commer Fisheries Bycatch for Scientific Gain	rcial W	/. Wilson/ LGL Alaska Research	NOAA	New	wr. project	\$128.1	\$0.0
	This project of Alaska. In samples use design at ap identification evaluate the	will investigate the feasibility of using commercial fishe itial efforts will include a comprehensive overview of o able for scientific purposes. Pilot research will be con propriate spatial scales. Sampling protocols will then preservation, and vouchering of specimens. Method sampling protocol and specify a future full-scale study	eries bycatch to commercial fishe nducted with sele be conducted to is for data analy y design.	increase scientific knowledge of pries, vessel types, seasons, an ected members of the fishing co field-test the design. Additiona sis and reporting of geospatial d	frare and in d locations mmunity to I methods ata will als	nfrequently- most likely develop a and procedu o be descrit	studied icth to yield regi statistically- ures will be bed. A final	yofauna in onal bycate valid exper described t report will	the Gulf ch imental for the

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02680	Remote Delivery of Persistent Organic Contaminants in Alas Fishes	ka S. Rice, J. Short, A. Moles/NOAA	NOAA	New 1st yr., 1	yr. project	\$75.6	\$0.0
This projec geographic known imp salmon ret Alaska.	ct will determine the distribution of persistent organic contaminar c areas of Alaska. A suite of contaminants, including pesticides, plications for aquatic and human health, will be measured in two turning after 3-5 years. This will give some measure of the exter	nts in the flesh and ovaries of different ye Polychlorinated biphenyls (PCBs), and o age classes of salmon. These will be sa nt of atmospheric distribution of industrial	ar classes chlorinateo Imon retui and agric	of chinoo and unch ming after ulture pollo	k salmon from lorinated hyd only a year in utants over a	m four maj rocarbons n saltwater range of ri	or , with and vers in
Public Inform	mation/Science Mgt./Admin.				\$1,846.8	\$2,037.4	\$0 .0
02100	Public Information, Science Management, and Administration	All Trustee Council Agencies	ALL	Cont'd	\$1,500.0	\$1,500.0	
Trustee Co of the 17-n FY 02 worl \$1,500,000	ouncil staff working at the direction of the Executive Director, the member Public Advisory Group (PAG), and Trustee agency parti- k plan of research, monitoring, and general restoration projects. 0.]	e scientific peer review process, public in cipation in the restoration program. [Not Detailed Project Description and budge	volvement e: This pr t not yet pr	efforts inc oject will b rovided; e>	luding the ac e funded out pected FY 0	tive partici side of the 2 cost is	pation regular
02350	Alaska SeaLife Center Bench Fees		ADFG	Cont'd	\$300.0	\$300.0	
This projec Council tha Vertebrate \$300,000 i	ct will pay for the use of labs and office space, as well as other d at have a SeaLife Center component. Two FY 02 proposals incl e Predators and 02558/New Technologies for Monitoring Harbor is based on FY 01 bench fees for these two projects.]	lirect expenses, at the Alaska SeaLife Ce ude a SeaLife Center component: Proje Seal Health. [Note: Detailed Project De	enter for th ct 02423/F scription a	iose project Population Ind budget	ts funded by Change in S not yet provi	the Truste elected Ne ided; estim	ee earshore ate of
02535	EVOS Trustee Council Restoration Program Final Report	EVOS Restoration Office	ADFG	Cont'd 2nd yr., 3	\$46.8 2 yr. project	\$50.1	\$0.0
This project Plan and d This project similar trus lessons lea	ct will provide a final report for the activities of the Trustee Counc disbursements of the final payment from Exxon. It will also include ct will increase public awareness and understanding of EVOS re stee situation) with a detailed history of the <i>Exxon Valdez</i> Oil Spi arned in the groundbreaking EVOS effort. This published history	cil, starting with the earliest damage asse de a complete history of the litigation lead storation activities, policies, and procedu Il Restoration process, including highligh y will include references and an index.	essment e ding to the res. It will ts and pitf	fforts and civil settle provide a alls, so tha	ending with th ment, which gencies and t others can	ne FY 02 V funds the (groups (fac benefit fror	Vork Council. cing a n
02550	Alaska Resources Library and Information Services (ARLIS)	All Trustee Council Agencies	ADFG	Cont'd		\$140.3	<u></u>
This project information cleanup, d	ct is the Trustee Council's contribution to the Alaska Resources n generated through the restoration process. In addition, ARLIS lamage assessment, and restoration efforts following the spill.	Library and Information Services (ARLIS acts as the public repository for reports). ARLIS and other	serves as materials	a central acc generated as	ess point fo a result of	or the

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, Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02570	Book on EVOS Science for General Readers	S. Loshbaugh/Freelance Writing	ADFG	New 1st yr., 1	yr. project	\$47.0	\$0.0

This project will produce a publication-ready, book-length manuscript about the scientific and restoration projects following the oil spill. Written for the intelligent lay reader, it will emphasize the cutting-edge quality, adventurous experiences, ethical issues and lucid, non-technical explanations of findings. Based on interviews, symposium presentations and review of the technical literature, it will include discussion of scientists' personal motivations, partnerships between Western and indigenous knowledge systems, legal entanglements, technical advances, the interdisciplinary ecosystem approach, and the implications both process and findings hold for future research design, science in the public arena, and the environment.

Project Ma	anagement					\$200.0	\$200.0	
02250	Project Management		All Trustee Council Agencies	ALL	Cont'd	\$200.0	\$200.0	
Project n	nanagement represents those cost	s incurred by the state and fec	leral Trustee agencies in fulfilling their re	sponsibilit	y to ensure	that individua	l projects are	

managed consistent with the Memorandum of Agreement and Consent Decree, the Restoration Plan, and Trustee Council authorization. Tasks performed by project managers include coordinating activities between principal investigators and the Restoration Office, reviewing project expenditure activity, assisting in the development of project proposals, and tracking project reports. [Note: Detailed Project Description and budget not yet provided; expected FY 02 cost is \$200,000.]

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
				Ĺ	All Proposals*	Work Pla	an Only**
		Total Continuing Projects FY 02	Expected:		\$4,704.1	\$3	,204.1
		Total Continuing Projects FY 02	Requested:		\$5,104.7	\$3	,604.7
		Total New Projects FY 02 Requ	ested:		\$6,791.0	\$6	,791.0
		Total New & Continuing Project	s FY 02 Reque	ested:	\$11,895.7	\$10	,395.7
		* 109 projects were received (4 for the following projects are est prepared: 02154/Archaeologica 02250/Project Management (\$2 02455/GEM Data Management 02100/Public Information/Science estimate has yet been develope budget was submitted for 02636 Communities.	1 continuing an timates, as bud al Repository P 00.0), 02350/A (\$150.0), 0263 ce Managemer ad for 02126/Ha 6/Recovery Thi	d 68 new). Igets have roject Man SLC Benc 80/GEM Pla ht/Administ abitat Prote rough Part	. The costs in not yet been agement (\$2 h Fees (\$300 anning (\$100 tration (\$1,50 ection Suppo nership with	cluded 9.1), 0.0), 0), 0.0). No t and no	
		** The Work Plan Only column I Information/Science Manageme Protection Support will also be f estimate is not yet included for t	includes all pro ent/Administrati funded outside that project.	jects exce on (\$1,500 of the wor	pt 02100/Pub).0). 02126/H k plan, but a	lic abitat cost	
		NOTE: The FY 02 funding cap is expected for 02100/Administr	set by the Cou ration and the l	incil is \$6. balance foi	5 million (\$1.5 r work plan pi	o million ojects).	
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Exxon Valdez Oil Spill Trustee Council

645 G Street, Suite 401, Anchorage, AK 99501-3451 907/278-8012 fax:907/276-7178



MEMORANDUM

TO:	Restoration Work Force PAG Representatives (Chuck Meacham, Chris Blackburn)
FROM:	میں Weandra Schubert, Program Coordinator

RE: FY 02 Restoration Proposals

DATE: April 18, 2001

This set of binders contains the Detailed Project Descriptions and detailed budgets submitted in response to the Trustee Council's FY 02 *Invitation to Submit Restoration Proposals*. In all, 107 research/monitoring/general restoration proposals totaling \$10.4 million were received. Two additional proposals (02100/Administration and 02126/Habitat Protection Support) will be funded outside of the work plan. The Council's funding cap for FY 02 is \$6.5 million (\$1.5 million is expected for 02100 and \$5 million for the work plan).

The front pocket of the first binder contains two spreadsheets:

- 1. A list of all proposals in numeric order. This list contains the project's assigned number and title, the name of the individual who submitted the proposal, and the project's assigned research cluster.
- 2. A list of all proposals by resource cluster. In addition to project number, title, and proposer, this list contains an abstract of the project, the project's assigned lead agency, the amount of funding requested for FY 02, and the project's duration (the number of years for which funding is being requested from the Trustee Council). For continuing projects, the spreadsheet also contains the FY 01 projection of the amount of funding needed in FY 02 (this column is labeled "FY 02 Expected"). Funding requests from non-Trustee agencies have been adjusted by Restoration Office staff to include agency "GA" (general administration).

Both of the spreadsheets are marked DRAFT. Please give me a call if you find any errors or omissions. Lead agencies and research clusters were assigned by Restoration Office staff, and are open to discussion.

The meeting of the Executive Director, Restoration Work Force, and two PAG members to develop the Draft Work Plan will be held in the Restoration Office (4th floor conference room) at 10:00 am Wednesday, June 6, 2001.
Exxon Valdez Oil Spill Trustee Council

645 G Street, Suite 401, Anchorage, AK 99501-3451 907/278-8012 fax:907/276-7178



MEMORANDUM

To: Core Peer Reviewers Stephen Braund, Pete Peterson, Jim Reynolds, Alan Springer, George Rose

From: Phil Mundy, Science Coordinator phil_mundy@oilspill.state.ak.us

Re: Conventions for peer review of FY 02 proposals

Date: April 17, 2001

The procedures for reviewing the FY 02 Detailed Project Descriptions (DPD) will be similar to last year. As in past years Bob Spies will assign projects to reviewers and send electronic review sheets for each project to each reviewer, and also send a memo documenting standard procedure under separate cover.

1. Primary reviewers are asked to e-mail the electronic review form for their projects to me with a copy to Deborah Florer, <u>florer@amarine.com</u> no later than the end of business on Thursday **May 17**. Please pay close attention to the section entitled "Overall assessment of this project and its relationship to the cluster and overall program." Secondary and tertiary reviewers are encouraged to do the same.

2. The subject line of the e-mail to me should read, **FY 02 DPD 02nnn** where nnn is the project number. Please attach the review form as a word processor file, and put the form inside the e-mail as text as a back up.

The explanation of how the electronic reviews will be used is as follows. At the peer reviewers' meeting the text of the primary reviewer's recommendation, and secondary and tertiary reviews, if available, will be projected on a screen during the discussion. The text will be edited as the discussion of the DPD proceeds. At the end of the discussion, the text should reflect as much as possible the sense of the group. The Chief Scientist will refer to this text when he prepares his recommendation for the Trustee Council. In this way, all participants can view the text as it evolves, and also have access to at least the text of the primary review.

Please note that you need to be generally familiar with the full suite of DPD's because you are asked to evaluate the proposals on which you are the primary reviewer in relation to the cluster (i.e., pink salmon) and overall restoration program. In addition to the questions on the electronic review form, consider the following questions in relation to the clusters and the overall program:

Are some projects especially important because they help achieve a balanced, integrated, ecologically-oriented whole? See especially pages 29 - 32 of the Invitation to Submit Restoration Proposals for Federal Fiscal Year 2002 (February 2001) and the

GEM Program document at <u>http://www.oilspill.state.ak.us/</u>. (Being generally familiar with the Invitation would be helpful to your review.)

Are some projects worthwhile and technically appropriate but less important than others?

Are some projects most appropriately considered to be within the normalmanagement responsibilities of the Trustee agencies?

Are some new projects more important than some ongoing projects?

Are there important gaps?

For continuing projects, take special note of the "Explanation of Changes in Continuing Projects" section of the DPD. This section is included with ongoing projects to simplify your work.

As always, your continued cooperation is vital to success. Looking forward to working with you. If you have any questions, please contact me, Bob, Sandra, or Molly.

cc: Bob Spies, Molly McCammon, Sandra Schubert, Andy Gunther

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<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
ι.2-BAA	Photographic and Acoustic Monitoring of Killer Whales in Prince William Sound and Kenai Fjords	C. Matkin/North Gulf Oceanic Society	Marine Mammals
02052	Community Involvement Planning for GEM	P. Brown- Schwalenberg/CRRC	Subsistence
02100	Public Information, Science Management, and Administration	All Trustee Council Agencies	Public Information/Science Mgt./Admin.
02126	Habitat Protection and Acquisition Support		Habitat Protection
02144	Common Murre Population Monitoring	D. Roseneau/USFWS	Seabird/Forage Fish and Related Projects
02154	Archaeological Repository, Display Facilities, and Exhibits for Prince William Sound and Lower Cook Inlet	J. Bittner/ADNR	Archaeological Resources
02159	Surveys to Monitor Marine Bird Abundance in Prince William Sound During Winter and Summer 2002	D. Irons/USFWS	Seabird/Forage Fish and Related Projects
02163-BAA	Alaska Predator Ecosystem Experiment in Prince William Sound and the Gulf of Alaska (APEX)	D. Duffy/Paumanok Solutions	Seabird/Forage Fish and Related Projects
02163M	Numerical and Functional Response of Seabirds to Fluctuations in Forage Fish Density	J. Piatt/USGS	Seabird/Forage Fish and Related Projects
(j)°	Construction of a Linkage Map for the Pink Salmon Genome	F. Allendorf/Univ. Montana	Pink Salmon
02195	Pristane Monitoring in Mussels	J. Short, P. Harris/NOAA	SEA and Related Projects
02210	Youth Area Watch	R. DeLorenzo/Chugach School District	Subsistence
02245	Community-Based Harbor Seal Management and Biological Sampling	V. Vanek/ADFG, M. Riedel/Alaska Native Harbor Seal Commission	Marine Mammals
02247	Kametolook River Coho Salmon Subsistence Project	J. McCullough, L. Scarbrough/ADFG	Subsistence
02250	Project Management	All Trustee Council Agencies	Project Management
02256B	Sockeye Salmon Stocking at Solf Lake	D. Gillikin/USFS	Subsistence
02290	Hydrocarbon Database and Interpretation Service	J. Short, B. Nelson/NOAA	Nearshore Ecosystem
02320	Sound Ecosystem Assessment (SEA): Printing the Final Report	W. Hauser/ADFG	SEA and Related Projects
02333	Sea Otter Monitoring	B. Henrichs/Native Village of Eyak	Subsistence
02340	Toward Long-Term Oceanographic Monitoring of the Gulf of Alaska Ecosystem	T. Weingartner/ UAF	Ecosystem Synthesis/GEM Transition

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<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
630	Alaska SeaLife Center Bench Fees		Public Information/Science Mgt./Admin.
02360-BAA	The <i>Exxon Valdez</i> Oil Spill: Guidance for Future Research Activities	C. Elfring/Polar Research Board, , NRC	Ecosystem Synthesis/GEM Transition
02372	Steller Sea Lion Monitoring	B. Henrichs/Native Village of Eyak	Subsistence
02395	Planning for Long-Term Monitoring in the Nearshore: Designing Studies to Detect Change and Assess Cause	T. Dean/Coastal Resources Associates, et al	Nearshore Ecosystem
02396	Alaska Salmon Shark Assessment	J. Rice, L. Hulbert/NOAA	Cutthroat Trout, Dolly Varden, and Other Fish
02401	Assessment of Spot Shrimp Abundance in Prince William Sound	C. Hughey/ Valdez Native Tribe, C. O'Clair/ NOAA	Subsistence
02404	Testing Archival Tag Technology in Alaska Salmon	J. Nielsen/USGS-BRD	Cutthroat Trout, Dolly Varden, and Other Fish
02407	Harlequin Duck Population Dynamics	D. Rosenberg/ADFG	Nearshore Ecosystem
02416	O'Brian Creek Enhancement	Chenega Bay IRA Council	Subsistence
3	Patterns and Processes of Population Change in Selected Nearshore Vertebrate Predators	J. Bodkin, D. Esler/USGS-BRD, T. Dean/CRA, Inc.	Nearshore Ecosystem
02434	Design of a Video System for Remotely Monitoring Seabirds at East Amatuli Island	A. Kettle/USFWS	Seabird/Forage Fish and Related Projects
02441-BAA	Harbor Seal Recovery: Effects of Diet on Lipid Metabolism and Health: Manuscript Preparation	R. Davis/Texas A&M	Marine Mammals
02452-BAA	Assessing Prey and Competitor/Predators of Pink Salmon Fry	R. Thorne/PWSSC	SEA and Related Projects
02455	Gulf Ecosystem Monitoring and Research Program Data System	Restoration Office	Ecosystem Synthesis/GEM Transition
02457-BAA	Monitoring the Fall-Winter Herring Biomass to Track the Recovery of the Prince William Sound Herring Stock	R. Thorne/ PWSSC	Pacific Herring
02462	Effects of Disease on Pacific Herring Population Recovery in Prince William Sound	G. Marty/Univ. of California, Davis	Pacific Herring
02475-BAA	GEM Data System Specification	S. Marley	Ecosystem Synthesis/GEM Transition
02476	Effects of Oiled Incubation Substrate on Pink Salmon Reproduction	R. Heintz/NOAA	Pink Salmon
4179	Effects of Food Stress on Survival and Reproductive Performance of Seabirds	J. Piatt/USGS-BRD, A. Kitaysky/Univ. of Washington	Seabird/Forage Fish and Related Projects

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<u>Pr</u>	oj.No.	Project Title	Proposer	Resource Cluster
L	J6-BAA	Links Between Persistent Oil in Mussel Beds and Predators	S. Rice/NOAA, T. Dean/Coastal Resources Associates, S. Jewett/UAF	Nearshore Ecosystem
024	492	Were Pink Salmon Embryo Studies in Prince William Sound Biased?	J. Thedinga/NOAA	Pink Salmon
02	503	Orca Inlet Restoration	B. Henrichs/Native Village of Eyak	Subsistence
02:	507	Nuchek Subsistence Camp	B. Henrichs/Native Village of Eyak	Subsistence
025	532	Coupling of Oceanic and Nearshore: The Search for Indicator Species	G. Irvine/USGS	Nearshore Ecosystem
025	535	EVOS Trustee Council Restoration Program Final Report	EVOS Restoration Office	Public Information/Science Mgt./Admin.
025	536	Synthesis of Spill Damaged Resource Information into the Heritage Data Management System	T. Gotthardt, K. Boggs/UAA	Ecosystem Synthesis/GEM Transition
025	538	Evaluation of Two Methods to Discriminate Pacific Herring Stocks along the Northern Gulf of Alaska	T. Otis/ADFG, R. Heintz/NOAA	Pacific Herring
025	543	Evaluation of Oil Remaining in the Intertidal from the <i>Exxon Valdez</i> Oil Spill	J. Short/NOAA	Nearshore Ecosystem
	6	Assessing Harbor Seals: Methods to Identify Metabolic Responses to Environmental Change	M. Castellini/UAF	Marine Mammals
025	550	Alaska Resources Library and Information Services (ARLIS)	All Trustee Council Agencies	Public Information/Science Mgt./Admin.
025	552-BAA	Exchange Between Prince William Sound and the Gulf of Alaska	S. Vaughn/Prince William Sound Science Center	SEA and Related Projects
025	556	Mapping Marine Habitats: The First Step in a Spatially Nested Monitoring Program	C. Schoch/Kachemak Bay Research Reserve	Nearshore Ecosystem
025	558	Harbor Seal Recovery: Application of New Technologies for Monitoring Health	S. Atkinson/UAF	Marine Mammals
025	561	Evaluating the Feasibility of Developing a Community- Based Forage Fish Sampling Project for GEM	D. Roseneau/USFWS	Seabird/Forage Fish and Related Projects
025	565	Bottom-Up vs. Top Down: What Forces Control Variability in Kachemak Bay?	C. Schoch/Kachemak Bay Research Reserve	Nearshore Ecosystem
025	69	Linked Monitoring Network for the Gulf of Alaska: A Workshop	C. Schoch/Kachemak Bay Research Reserve, G. Eckert/UAS	Nearshore Ecosystem
025	570	Book on EVOS Science for General Readers	S. Loshbaugh/Freelance Writing	Public Information/Science Mgt./Admin.
<u>025</u>	74-BAA	Assessment of Bivalve Recovery on Treated Mixed-Soft Beaches in Prince William Sound	D. Lees/Littoral Ecological & Environmental Services	Nearshore Ecosystem
025	578	The Marine Macrofauna of Prince William Sound: An Annotated List	N. Foster, H. Feder	Nearshore Ecosystem

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<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
4 ي	Evaluation of Airborne Remote Sensing Tools for GEM Monitoring	E. Brown/UAF, J. Churnside/NOAA	Ecosystem Synthesis/GEM Transition
02589-BAA	PWSRCAC - EVOS Long Term Environmental Monitoring Program	J. Devens/ PWSRCAC	Nearshore Ecosystem
02593	River Otters and Fishes in the Nearshore Environment: A Synthesis	S. Jewett/UAF	Nearshore Ecosystem
02597-BAA	Ocean Color Time Series of Prince William Sound	S. Pegau/ OSU	Ecosystem Synthesis/GEM Transition
02600	Synthesis of the Ecological Findings from the EVOS Damage Assessment and Restoration Programs, 1989-2001	R. Spies/EVOS Chief Scientist, et al	Ecosystem Synthesis/GEM Transition
02601-BAA	GEM Transition: Addressing Methodological Data Gaps	T. Kline/ PWSSC	SEA and Related Projects
02603	Implementation of an Ocean Circulation Model: A Transition from SEA to GEM	J. Wang/UAF	SEA and Related Projects
02604	Gear Selectivity in Trawl Surveys along the Northern Gulf of Alaska	W. Bechtol/ADFG	Ecosystem Synthesis/GEM Transition
02608	Permanent Archiving of Specimens Collected in Nearshore and Deep Benthic Habitats	N. Foster/UAF	Nearshore Ecosystem
62239	Long-Term Temperature/Salinity Monitoring Within the Alaska Coastal Current	T. Weingartner/UAF	Ecosystem Synthesis/GEM Transition
02610	Kodiak Archipelago Youth Area Watch	T. Schneider/Kodiak Island Borough School District	Subsistence
02612	Detecting and Understanding Marine-Terrestrial Linkages in the Kenai River Watershed	W. Hauser/ADFG	Habitat Improvement
02614	Monitoring Program for Near-Surface Temperature, Salinity, and Fluorescence in the Northern Pacific Ocean	S. Okkonen/UAF	Ecosystem Synthesis/GEM Transition
02617	Standing Stock and Secondary Production of Zooplankton in Prince William Sound	R. Hopcroft, K. Coyle/UAF	SEA and Related Projects
02618-BAA	Measurements of Tide Rip Front Variability in Cook Inlet	S. Saupe/CIRCAC	Ecosystem Synthesis/GEM Transition
02621	Kenai River Flats Conservation Easement and Public Education	M. Kuwada/ADFG	Habitat Improvement
0 2 622	Digital Maps from Existing Seasonal Environmental Sensitive Area Maps: Cook Inlet/ Kenai Peninsula	J. Whitney/ NOAA	Ecosystem Synthesis/GEM Transition
02624-BAA	A CPR-Based Plankton Survey Using Ships of Opportunity to Monitor the Gulf of Alaska	S. Batten/SAHFOS, D. Welch/DFOC	Ecosystem Synthesis/GEM Transition

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Pro	j.No.	Project Title	Proposer	Resource Cluster
C	.7-BAA	A Symbiotic Acoustic Signal Processor to Increase Stock Assessment Effort	J. Dawson/BioSonics, Inc.	Ecosystem Synthesis/GEM Transition
026	28-BAA	Resurrection Bay Contaminant Survey	P. Homan/ Qutekcak Native Tribe	Ecosystem Synthesis/GEM Transition
026	29-BAA	Development of a Paradigm for Ecosystem Monitoring	R. Thorne/PWSSC	Ecosystem Synthesis/GEM Transition
026	30	Planning for Long-Term Monitoring and Research Program	Restoration Office	Ecosystem Synthesis/GEM Transition
02 6:	33	Acquisition of Chemical, Physical, and Biological Information on Kodiak Regional Water Quality	R. Ward/Kodiak Area Native Association	Ecosystem Synthesis/GEM Transition
026	34	Expanding the Seabird Tissue Archival and Monitoring Project (STAMP) Program for GEM	D. Roseneau/USFWS, G. York/BRD, P. Becker/NIST	Seabird/Forage Fish and Related Projects
0 26:	36-BAA	Ecosystem Recovery Through a Partnership with the Spill-Impacted Communities	K. Adams, B. Perrine, R. Mullins/Cordova	Ecosystem Synthesis/GEM Transition
0263	37	Online Early Life History Database for the Northeast Pacific Ocean, Gulf of Alaska and Southeast Bering Sea	J. Duffy-Anderson/NOAA	Ecosystem Synthesis/GEM Transition
026	39 39	Field Experiments for Testing Spill-Impacts Hypotheses from Long-Term Monitoring	G. Shigenaka/NOAA HAZMAT	Nearshore Ecosystem
0264	40	High Frequency Surface Wave Radar Test in Prince William Sound	A. Kotlarov/Alaska Marine Technology Corp.	Ecosystem Synthesis/GEM Transition
0264	43	Design of the Environmental Specimen Bank Program for GEM	P. Becker/NIST	Ecosystem Synthesis/GEM Transition
02 64	14	Molecular Biomarkers as a New Technique for Assessing Physiological Contaminant Stress	G. Shigenaka/NOAA HAZMAT	Nearshore Ecosystem
0264	46-BAA	Information Dissemination through the Web: Developing an Interactive Database on Southcentral Alaskan Seaweeds	M. Stekoll/UAS	Nearshore Ecosystem
0264	48-BAA	Cost Effective Data Acquisition Using Adaptive Sampling and Combining Information Strategies	D. Dorsett/Baylor Univ.	Ecosystem Synthesis/GEM Transition
0 264	19	Reconstructing Sockeye Populations in the Gulf of Alaska over the Last Several Thousand Years	D. Finney/UAF	Sockeye Salmon
0268	52	Links Between Persistent Oil in Mussel Beds and Predators	S. Rice/NOAA, T. Dean/Coastal Resources Associates, S. Jewett/ UAF	Nearshore Ecosystem
	5-BAA	Transition Support for the GEM Data Manager	C. Falkenberg/ECOlogic Corp.	Ecosystem Synthesis/GEM Transition

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<u>Proj.No.</u>	Project Title	Proposer	Resource Cluster
6ر	Retrospective Analysis of Nearshore Marine Communities Based on Analysis of Archaeological Material and Isotopes	G. Irvine/USGS, J. Schaaf/NPS	Nearshore Ecosystem
02657	Analysis of Genomic Stress Response in Sea Otters	C. Mohr, J. Stott/UC Davis, B. Ballachey/USGS	, Nearshore Ecosystem
02659	Preparation and Publication of Results from SEA and NVP Avian Predation Studies	M. Bishop/ PWSSC	Seabird/Forage Fish and Related Projects
02662	Natural Life Restoration by Manulipitation	J. Rusher/Rusher's Services	Nearshore Ecosystem
02663	"Watchdog Tool" for Sampling and Monitoring	J. Rusher/Rusher's Services	Nearshore Ecosystem
02664	Retrospective Analysis of 30 Years of Seabird Distribution and Diet Data	J. Piatt/USGS	Seabird/Forage Fish and Related Projects
02667	Effectiveness of Citizens' Environmental Monitoring Program	S. Mauger/Cook Inlet Keeper	Ecosystem Synthesis/GEM Transition
02668	Developing an Interactive Water Quality and Habitat Database and Making it Accessible on the Web	J. Cooper/Cook Inlet Keeper	Ecosystem Synthesis/GEM Transition
02669	Hooligan Research	B. Henrichs/Native Village of Eyak	Subsistence
01131-BAA	Coordinating Volunteer Vessels of Opportunity to Collect Oceanographic Data in Kachemak Bay and Lower Cook Inlet	D. Stram, C. Schoch/Kachemak Bay Research Reserve	Ecosystem Synthesis/GEM Transition
02673	Continuing Decline of Pigeon Guillemots in the Oiled Portion of Prince William Sound	D. Irons/USFWS, D. Roby/OSU	Seabird/Forage Fish and Related Projects
02674-BAA	Assessing Pigeon Guillemot Restoration Techniques and Feathers as Biomonitors	J. French/Pegasus Enterprises, G. Divoky/UAF	Seabird/Forage Fish and Related Projects
02677	English Bay River Sockeye Salmon Enumeration Project	C. Kvasnikoff/Nanwalek IRA Council	Subsistence
02678-BAA	Identifying Community-Based Ways to Use Commercial Fisheries Bycatch for Scientific Gain	W. Wilson/ LGL Alaska Research Associates	Ecosystem Synthesis/GEM Transition
02680	Remote Delivery of Persistent Organic Contaminants in Alaska Fishes	S. Rice, J. Short, A. Moles/NOAA	Ecosystem Synthesis/GEM Transition



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INDEX OF PROPOSALS BY ROUNCE CLUSTER -- FY 02

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
Pink Salmon	L				\$279.0	\$231.8	\$116.3
02190	Construction of a Linkage Map for the Pink Salmon Genome	F. Allendorf/Univ. Montana	ADFG	Cont'd 7th yr., 7	\$240.0 yr. project	\$168.0	\$80.3
This project traits that an collected fro compared to project, whi	t will complete the analysis of experiments conducted at the Alas re important to recovery of pink salmon (e.g., growth and surviva om Likes Creek are expected to return to Resurrection Bay and t to returning adults to test for genetic differences in marine surviva ich was scheduled to close out in FY 02, is now requesting \$80,3	ka SeaLife Center that use the linkag I). Sexually mature adults from the 19 the SeaLife Center in August and Sep al and other life history traits (e.g., boo 00 for FY 03.]	e map to te: 999 cohorts tember 200 ly size, egg	st for effec produced 1. Genoty number, a	ts of regions from wild pin pes in releas nd egg size)	of the gen k salmon ed fry will l . [Note: Th	ome on De lis
02476	Effects of Oiled Incubation Substrate on Pink Salmon Reproduction	R. Heintz/NOAA	NOAA	Cont'd 4th yr., 5	\$39.0 yr. project	\$39.8	\$36.0
Populations the ability o beginning ir return as m represents do not exist	s are maintained through successful reproduction; this project is of the parental generation (P1) to produce offspring (F1) is under on FY 01. After the F1 emerges in spring 2001, the fish will be ma nature adults. At that time, the project will measure the ability of t a genetic effect transmitted to unexposed generations. Such an t.	designed to determine if exposure to o way. The P1 was exposed when they arked and released. At the end of FY the F1 to produce viable offspring (F2) effect was demonstrated in similarly to	bil impairs p incubated i 02, the rele). A diminis treated pink	ink salmor n 1998; the ased fish v hed ability salmon in	reproductio F1 incubate vill be recove to produce to 1997, but co	n. Examin ed in clean ered when he F2 gene prroborating	ation of water they eration g data
02492	Were Pink Salmon Embryo Studies in Prince William Sound Biased?	J. Thedinga/NOAA	NOAA	Cont'd 2nd yr., 3	2 yr. project	\$24.0	\$0.0
Effects of th contends th times were and previou shock resis from a strea were easily sampling in	he oil spill on wild pink salmon embryo survival in Prince William nat the government's conclusions that reduced embryo viability in earlier in oiled streams than in reference streams. Experimenta usly dead eggs were conducted to help ascertain if estimates of e stance of eggs increased in a sigmoidal fashion from the end of S am is critical in differentiating shocked eggs from previously dead discernible and could easily be separated from previously dead the sound following the oil spill would not help clarify the control	Sound are disputed among governme oiled streams was caused by persiste I studies to determine the ability to dis embryo survival in the sound were acc September to mid November and that d eggs. By removing eggs pumped fro eggs. These results suggest that furt versy over potential biased estimates of	ent- and ind ent oil conta criminate e surate or bia the timing o om stream her examina of egg survi	ustry-spon amination v ggs killed b ised. Preli if egg exan gravel sooi ation of pro val.	sored resear vere biased t by sampling (minary result nination after n after samp ocedures use	chers. Expecause sa shock more sindicate being pur ling, shock ed for egg	kon empling tality) that nped ed eggs

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	Request
Pacific Her	ring				\$47.1	\$210.7	\$85.6
02457-BAA	Monitoring the Fall-Winter Herring Biomass to Track the Recovery of the Prince William Sound Herring Stock	ne R. Thorne/ PWSSC	NOAA	New 1st yr., 2	yr. project	\$86.0	\$85.6
The herrir have reve The spill i Fish and o surveys o	ng population in Prince William Sound has declined about fealed intense predator activity on overwintering aggregation is implicated as a factor in this decline. A limited monitoring Game. Because of the critical state of this resource and its fadults and juveniles as a measure of mortality and an ear	ifty-fold since the oil spill and is in a virtual stat is of herring, which includes several predators g program has been maintained by the Oil Spil s importance to the health of the sound, this pr ly indicator of future recovery.	e of collap that are ei I Recovery oject will ei	se. Recent ther threate Institute a xpand the s	t infrared sc ened or oil-da nd the Alask survey effort	anning sun amaged sp a Departm by includin	/eys ecies. ent of ig fall
02462	Effects of Disease on Pacific Herring Population Record Prince William Sound	very in G. Marty/Univ. of California, Davis	ADFG	Cont'd 4th yr., 3	\$0.0 yr. project	\$77.4	\$0.0
The Pacif predicts th relationsh importanc study is p	ic herring population of Prince William Sound has not reco hat fisheries closed since 1999 will not open for several yea hip between disease prevalence and population change, an ce of Pacific herring in the Prince William Sound ecosystem roposed to ensure seamless flow of data from this project	vered from severe population decline in 1993. ars. Long-term systematic disease monitoring d this information significantly improves the ab n, and the importance of this project to marine to GEM.	The Alask and resea illity to fore fisheries w	a Departm rch since 1 cast popul orldwide, a	ent of Fish a 994 has sho ation change an additional	and Game own a clear e. Because year of dis	now ⊨of the ease
02538	Evaluation of Two Methods to Discriminate Pacific Her Stocks along the Northern Gulf of Alaska	T. Otis/ADFG, R. Heintz/NOAA	ADFG	Cont'd 2nd yr., 2	\$47.1 2 yr. project	\$47.3	\$0.0
This proje profile and analyzed future eva	ect will perform a comparative investigation of two promisin alysis of select soft tissues. Limited samples from Sitka So to determine if stock differences are detectable by each pr aluations of the temporal and structural (i.e., sex, age, matu	g stock identification techniques for Pacific her ound, Prince William Sound, Kamishak Bay, Ko ocedure, and at what scale. Successful result urity) stability of these biomarkers.	rring eler odiak Islan s from this	nental ana d, and Tog pilot study	lysis of otolit iak will be co should be fo	hs and fatt bliected and bliowed up	γ acid ל with
SEA and R	Related Projects				\$150.6	\$551.3	\$140.0
02195	Pristane Monitoring in Mussels	J. Short, P. Harris/NOAA	NOAA	Cont'd 7th yr., 7	\$50.0 yr. project	\$55.0	\$55.0
This proje	ect has focused on elucidating the transport mechanism of	pristane from Neocalanus ssp copepods into r	nussels in	Prince Wil	liam Sound f	or the prev	ious six

This project has focused on elucidating the transport mechanism of pristane from *Neocalanus ssp* copepods into mussels in Prince William Sound for the previous six years. In FY 00 and FY 01 the utility of monitoring the response of pristane in mussels to mass-release of juvenile pink salmon from Prince William Sound hatcheries was successfully initiated, using pristane concentration levels. This project will continue with this direction to assess feeding conditions for juvenile pink salmon during the critical period of initial marine residence, and will forecast survivals through his period. Forecasts will be compared to actual returns to assess reliability. [Note: The principal investigators have proposed that this project be continued indefinitely.]

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INDEX OF PROPOSALS BY ROURCE CLUSTER -- FY 02

Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02320	Sound Ecosystem Assessment (SEA): Printin	g the Final Report	W. Hauser/ADFG	ADFG	Cont'd 8th yr., 8	\$0.0 yr. project	\$6.2	\$0.0
This project 1,000 page encumbere	ct will print, bind and distribute the Sound Ecosystes es (some with color). Funding for copying, bindin ed funds cannot be spent after June 30, 2001. T	tem Assessment (S g and mailing the fi he FY 00 unused fu	SEA) final report. The integrated fina nal report was provided in FY 00, bu inds will lapse.	Il report is It completi	a required on has bee	document ex n delayed ar	pected to d the	exceed
02452-BAA	Assessing Prey and Competitor/Predators of	Pink Salmon Fry	R. Thorne/PWSSC	NOAA	Cont'd	\$0.0	\$38.9	\$0.0
					2nd yr., 2	2 yr. project		
to make th Vehicle Sy interaction design and program.	ese estimates was initiated in spring 2000 by a p stem and the Alaska Department of Fish and Ga with Project 01195 which is studying the use of d recommend procedures as a potential element	artnership of organ me. The Trustee C pristane concentrat in GEM (the Truste	izations including the Oil Spill Recov Council provided funds to expand thi tion in mussels to estimate pink salm e Council's long-term monitoring pro	ery Institu s effort in non fry sur ogram), Os	te (OSRI), 2001 (Proj vival. FY 0 SRI, or a co	Sound Emer ect 01452), in 2 funding will ombined insti	gency Res ncluding finalize the tutional mo	pon se e survey onitoring
02552-BAA	Exchange Between Prince William Sound and Alaska	the Gulf of	S. Vaughn/Prince William Sound Science Center	NOAA	Cont'd	\$100.6	\$102.5	\$0.0
One of the Alaska and northern G Hinchinbro and salinity series will	e least understood physical processes that influent d Prince William Sound. This project will docume sulf of Alaska at Hinchinbrook Entrance, and iden bok Entrance to create time series of velocities sp y. To identify the dominant factors that govern Pr be combined with meteorological and physical da	ice the biological co ent the interannual v tify mechanisms go panning three years rince William Sound ata collected under	omponents of Prince William Sound variability in water mass exchange b overning this exchange. The project . The mooring will be equipped with d/Gulf of Alaska exchange, the moor other research programs already in	is the exch etween Pr will deploy a CTD to ing velocit progress.	hange betw ince Williar / an upwar create a tii y and deep	veen the nort n Sound and d looking AD me series of temperature	hern Gulf c I the adjace CP moorin deep temp e/salinity tir	of ∋nt ig in erature ne
02601-BAA	GEM Transition: Addressing Methodological	Data Gaps	T. Kline/ PWSSC	NOAA	New		\$189.5	\$85.0
					1st yr., 2	yr. project		
Recent res affect recru landed fish and anthro the stable isotope eff	search using natural stable isotope abundance ha uitment and nutritional processes in fish. Prince a appear to undergo long-term systematic shifts. A pogenic trophic level effects on fish and other ec isotope methodology that can be addressed with fects among macro-zooplankton taxa and (2) dev	as shown that the a William Sound isoto Accordingly, GEM v osystem componer in the next year usin elop non-lethal isot	dvective regime connecting the north ope data has also been used to mea will need to use stable isotope abund nts as part of long-term monitoring s ng GLOBEC and OSRI sampling pla ope sampling for fishes.	hern Gulf o sure relati lance to ao tudies. Ho tforms. Th	of Alaksa w ve trophic l ddress the owever, the his study w	vith Prince W evel. The tro effects of ad ere are prese ill (1) addres	illiam Sour ophic levels vective pro ntly data ga s inter-spe	id may s of cesses aps in cies

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02603	Implementation of an Ocean Circulation Model: A Tran from SEA to GEM	sition J. Wang/UAF	ADFG	New 1st yr., 1	yr. project	\$73.2	\$0.0
This proje and a bio (about 3.7 for Enviro	ect will establish a 3-D ocean circulation model in the Gulf o ogical model. This model will cover the entire gulf, includin /km at 60"N). This model will be forced by tides, the Alaska nmental Prediction.	of Alaska to lay down a foundation for GEM in on ng Prince William Sound and Cook Inlet. The l a Current inflow/outflow, freshwater discharge	order to cou horizontal r , and wind :	uple this m esolution o stress deri	nodel to a hyd of this model ived from the	rological n is 4'x2' mir National C	nodel nutes Center
02617	Standing Stock and Secondary Production of Zooplank Prince William Sound	kton in R. Hopcroft, K. Coyle/UAF	ADFG	New 1st yr., 1	yr. project	\$86.0	\$0.0
Understan Systemat although set the sta detailed a	nding the seasonal cycles and inter-annual variability of zoc ic sampling of the zooplankton in central waters of Prince V the Gulf of Alaska GLOBEC program began in that same ye age for GEM activities by enhancing current sampling within inalysis of recent nearshore zooplankton collected by Prince	oplankton is essential for understanding the su William Sound was discontinued in 1997 with the ear, its sampling techniques are not comparate n the GLOBEC program to allow direct compare e William Sound Aquaculture Corporation hate	ccess of hi ne complet ble to the S rison to ear cheries.	gher verte ion of the EA and ea rlier data s	brate trophic SEA project (arlier data sets arts, and integ	levels. /320) and s. This pro grate this w	oject will vith
Sockeye S	almon					\$102.8	\$0.0
02649	Reconstructing Sockeye Populations in the Gulf of Alas the Last Several Thousand Years	ska over D. Finney/UAF	ADFG	New 1st yr., 1	yr. project	\$102.8	\$0.0
This proje River wat What is th historical	ect will reconstruct the last 2,000 years of changes in socke ershed) by analyzing ¹⁵ N in lake sediments. This new data ne normal variability in sockeye salmon populations in the G perspective on present conditions and by developing new h	eye salmon abundance in Eshamy Lake (Princ will be synthesized with ongoing studies at Ka Gulf of Alaska? This research will contribute to hypotheses about the climatic causes of popul	e William S rluk Lake (developm ation fluctu	Sound) and Kodiak Isl ent of the ations in C	d Upper Russ and). The res GEM prograr Gulf of Alaska	ian Lake (l search que n by provio salmon.	Kenai stion is: Jing a
Cutthroat 1	rout, Dolly Varden, and Other Fish			- Ma da da 600 di di da 600 a di anti-	\$0.0	\$133.8	\$0.0
02396	Alaska Salmon Shark Assessment	J. Rice, L. Hulbert/NOAA	NOAA	Cont'd 3rd yr., 2	\$0.0 2 yr. project	\$2 9.2	\$0.0
This proje analysis a data trans collected during the contracte the project	ect will fund a closeout year of data analysis and manuscrip and final write-up of (a) data transmitted from satellite tags of smitted from satellite tags deployed on salmon sharks that y during 2001 field sampling and pre-arranged stomach sam a 2001 commercial fishing season. The funding will also co d data analysis. The final report will describe salmon shark st.	t preparation for this two year study of salmon deployed on salmon sharks that will be schedu will transmit when sharks frequent surface wat pple collections from the Copper River gillnet flu- over FY 02 Argos time, NOAA Joint Tariff Agre < movements, habitat utilization, regional fidelit	sharks in f iled to trans ters during eet and the ement cost y, and diet	Prince Wil smit during summer, s Prince W ts for sate compositi	liam Sound. g winter and s and (c) stoma illiam Sound llite tag data r on from data	Funding w spring of 20 ach sample salmon se ecovery, a collected o	Il cover)02, (b) is ine fleet nd luring



Proi No	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02404	Testing Archival Tag Technology in Alaska Salmon	J. Nielsen/USGS-BRD	DOI	Cont'd 2nd vr., 2	2 vr. project	\$104.6	
Archive ta Gulf of Ala in Cook Ir (200-250r and grow implemen recoverie salmon us	ags with temperature and light-geolocation sensors will be moni- aska developed under Project 00478 will be applied in this stud- nlet. Salmon for this study will be reared in captivity (at the Ala- mm) and released in Cook Inlet as part of the department's Ship th for coho in captivity. Ship Creek coho will be tagged mid-Ma- ntation and retention of these tags. Surveys for early jack recov- s will be done in the coho commercial fishery in Cook Inlet and se of marine habitats, migration routes, contribution to the sport	tored for post-smolt coho salmon in Coo y of movement and migration paths for ska Department of Fish and Game hatc o Creek sport-fishing hatchery release. y. A spring release experiment in the fir eries will be done at the Ship Creek wei the derby sport fishery on Ship Creek.	ok Inlet. Ligh coho salmon hery at Fort I FY 01 incluc rst year will b r and among Archive tagg for salmon in	at/location r during ma Richardson les pilot stu e continge sport fishe ed fish will Cook Inle	relationships ituration in oc b) to 1+ year idies of tag r nt on the suc ers. Monitor be used to d t.	specific to cean enviro of age etention, be ccessful ing for adul locument co	the nments havior, t tag bho
Marine Ma	mmals				\$153.4	\$3,58.5	\$102.0
02012-BAA	A Photographic and Acoustic Monitoring of Killer Whales in Prince William Sound and Kenai Fjords	C. Matkin/North Gulf Oceanic Society	NOAA	Cont'd 10th yr.		\$79.7	\$74.9
, This proje Sound/Ke monitorin funds.	ect will continue the monitoring of the damaged AB resident pod enai Fjords killer whales. Monitoring has occurred on a yearly b g with remote and vessel-based hydrophone systems. The pro-	and the potentially endangered AT1 tra asis since 1984. Methods include the p ject continues interpretation of current a	ansient popu hoto-identific and previous	lation as we cation of ind data as we	ell other Prin dividual wha ell as data co	ce William les and acc illected with	ustic other
02245	Community-Based Harbor Seal Management and Biologica Sampling	al V. Vanek/ADFG, M. Riedel/Alas Native Harbor Seal Commission	ska ADFG n	Cont'd 9th yr., 9	\$25.0 yr. project	\$26.8	\$0.0
Under this collect bid analysis a and along sampling	s project, village-based technicians are selected by the Alaska I blogical samples from harbor seals. The samples are transport and the University of Alaska museum for archiving. In FY 02, th g the Alaska Peninsula will continue. The Alaska Native Harbor program. FY 02 is the close out year for this project.	Native Harbor Seal Commission and tra ed to Anchorage or Kodiak for further sa le sample collection program in Prince V Seal Commission will produce and dist	ined by the A ampling and Nilliam Soun ribute a new	Alaska Dep distributior id, lower Ci sletter with	partment of F n to participat ook Inlet, arc summaries	ish and Ga ling scientis ound Kodial of the biolo	me to sts for (island, gical
02441-BAA	Harbor Seal Recovery: Effects of Diet on Lipid Metabolism Health: Manuscript Preparation	and R. Davis/Texas A&M	ADFG	Cont'd 4th yr., 4	\$0.0 yr. project	\$68.1	\$0.0
This proje to the Tru of lipid an under diff	ect will complete the analysis of samples that were taken by this istee Council in FY 01. In addition, a final report and five manu- id how it changes with diet in harbor seals. Analysis of the rema rerent diets, and will allow better interpretation of field data for w	project in earlier years, but that could n scripts will be prepared. The results will aining samples is needed to resolve the vild harbor seals.	not be compl I provide a be temporal sc	eted due to etter under ale of char	a shortage standing of t nges in fatty a	of funds av he nutrition acid compo	ailable al role sition

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02546	Assessing Harbor Seals: Methods to Identify Metabolic Responses to Environmental Change	M. Castellini/UAF	ADFG	New 1st yr., 1	yr. project	\$50.4	\$0 .0
This proje seals. Mu animals b GEM prop	ect will provide final design and sensitivity testing for a sampling uch like the concept of genetic fingerprinting, this method uses ased on a suite of 20-30 blood chemistry values. The propose bosal. The FY 02 project will conduct the pre-development test	scheme and software approach to mor a novel blood chemistry fingerprinting te rs termed this method "Metabolic Identit ting of the method and test its strength a	nitoring popula echnique that ty" and intend and robustnes	ation-wide can easily to use it a s.	health patter separate sul s the core of	ns in harbo b-populatio a long-run	or ns of ning
02558	Harbor Seal Recovery: Application of New Technologies for Monitoring Health	or S. Atkinson/UAF	ADFG	Cont'd 2nd yr., 3	\$128.4 9 yr. project	\$133 .5	\$27.1
This proje harbor se (IgG, IgM, brought in tochnique	ect will investigate the potential for new technologies to assess a als. Analysis of thyroxine (T_4) , triiodothyronine (T_5) , and cortiso, and IgA) and the body burden of organochlorine contaminants to the Alaska SeaLife Center for rehabilitation. Once the profiles will be overlapped for routine monitoring of free-ranging seals	and monitor the endocrine and immune of (primary metabolic and gluconeogenic s will provide an assessment of both per es of healthy seals and those failing to t in an effort to restore this species. [Not	systems as o hormones), a manently cap hrive in their e: Alaska Sea	liagnostic i and measu otive seals natural env aLife Cente	measures of irement of im as well as se vironment are er bench fees	the health munoglob eals that are e assessed s will need	of ulins e , these to be
added to	this project.]						
added to Nearshore	this project.]				\$130.0	\$2,4 2 0.2	\$609.0
Nearshore	Ecosystem Hydrocarbon Database and Interpretation Service	J. Short, B. Nelson/NOAA	NOAA	Cont'd 11th yr.	\$130.0 \$35.0	\$2,420.2 \$35.0	\$609.0 \$35.0
Nearshore 02290 This ongo data repre restoratio storage a	Ecosystem Hydrocarbon Database and Interpretation Service bing project provides data and sample archiving services for all esent samples collected since the oil spill in 1989 to the presen n data. Additionally, this project provides interpretive services f nd maintenance of the hydrocarbon sample archives. [Note: The	J. Short, B. Nelson/NOAA samples collected for hydrocarbon anal t and include environmental and laborat for hydrocarbon analysis, public release he principal investigator has proposed th	NOAA ysis in suppo ory National I s of the hydro hat this project	Cont'd 11th yr. rt of Truste Resource I bcarbon an ct be contir	\$130.0 \$35.0 ee Council pr Damage Ass d pristane da nued indefinit	\$2,420.2 \$35.0 ojects. The essment at atabases, a tely.]	\$609.0 \$35.0 ese nd ind
Nearshore 02290 This ongo data repro- restoratio storage a 02395	Ecosystem Hydrocarbon Database and Interpretation Service bing project provides data and sample archiving services for all esent samples collected since the oil spill in 1989 to the present n data. Additionally, this project provides interpretive services for nd maintenance of the hydrocarbon sample archives. [Note: The Planning for Long-Term Monitoring in the Nearshore: Design Studies to Detect Change and Assess Cause	J. Short, B. Nelson/NOAA samples collected for hydrocarbon anal t and include environmental and laborat for hydrocarbon analysis, public release he principal investigator has proposed th gning T. Dean/Coastal Resources Associates, et al	NOAA ysis in suppo ory National I s of the hydro hat this project	Cont'd 11th yr. rt of Truste Resource I bcarbon an ct be contir New 1st yr., 2	\$130.0 \$35.0 ee Council pr Damage Ass d pristane da nued indefinit yr. project	\$2,420.2 \$35.0 ojects. The essment an atabases, a tely.] \$92.0	\$609.0 \$35.0 ese nd nd



Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02407	Harlequin Duck Population Dynamics	D. Rosenberg/ADFG	ADFG	Cont'd 3rd yr., 4	yr. project	\$68.7	\$43.0
Harlequin unoiled ar recruitmer surveys w FY 02 will	duck populations have not recovered from the effects reas. This project will conduct late-winter boat surveys nt will be compared between oiled and unoiled areas in rill also help identify changes to the Gulf of Alaska ecos be the final year of field-work for the project.	of the oil spill. Populations are declining in oiled to assess the recovery of ducks inhabiting oiled Prince William Sound to assess trends, popula system and improve the ability to differentiate be	l areas of Pri l areas. Pop tion dynamic tween natura	ince William ulation struc s, and the p al and man-	Sound whil cture, abund progress of r caused popu	le increasir lance, and recovery. ulation cha	ig in lhe nges.
02423	Patterns and Processes of Population Change in S Nearshore Vertebrate Predators	elected J. Bodkin, D. Esler/USGS-BRD Dean/CRA, Inc.	, T. DOI	Cont'd 4th yr., 5	yr. project	\$361.6	\$250.0
the intent and abund Harlequin between o added to to 02486-BAA	of understanding constraints to recovery of these spec dance, estimates of age-specific survival rates, and ex- duck field studies will examine the relationship betwee oil exposure and CYP1A induction, and metabolic and t this project.]	Predators S. Rice/NOAA, T. Dean/Coasta Resources Associates, S.	sea otter wor ange in abur harlequin d laska SeaLit	k will include idance in re ucks will exa fe Center be New 1st vr., 2 y	e aerial surv lation to pre amine the re ench fees wi	eys of disti y productio elationships ill need to b \$170.8	ibution in. ie \$130.0
Links betw Significan vertebrate future mot persistenc	ween oil-contaminated mussel beds and impacts on inf t oil concentrations in some mussel beds have persiste predator exposure to oil. The possibility that oiled bed nitoring and response decisions in the event of future s ce of <i>Exxon Valdez</i> oil in mussel beds, infauna, and in	Jewett/UAF auna and vertebrate predators have been inferred to present, much longer that originally expect as are long-term sources of vertebrate contamin spills. In a more holistic approach that in the pase nearshore vertebrate predators.	ed, but have ed, and may nation was ur st, this projec	not been de explain con nanticipated st will examin	efinitively de Itemporary o , and has im ne evidence	monstrate observatior pplications of for links b	1. is of for etween
02532	Coupling of Oceanic and Nearshore: The Search for Species	or Indicator G. Irvine/USGS	DOI	New 1st yr 1 y	vr. project	\$121.3	\$0.0
This proje realm, and longer-ten identifying	ct will (a) identify nearshore species whose abundance d that could serve as sentinels of change for GEM, (b) m decline, increases, etc.), and (c) propose mechanisr processes that could also be monitored.	es are coupled with low-frequency dynamic proc examine other types of trends occurring for nea ns that could be responsible for cyclical or direc	esses (e.g., rshore speci tional chang	regime shift es with histo es in specie	s) occurring prical record s abundanc	in the oce ls (e.g., es, thereby	anic / .

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02543	Evaluation of Oil Remaining in the Intertidal from the <i>Exxon</i> Valdez Oil Spill	J. Short/NOAA	NOAA	Cont'd 2nd yr., 2	\$95.0 2 yr. project	\$113.1	\$0.0
This proje be intensi will be sar preparatio	ect will assess the amount of oil remaining from the oil spill on shore vely sampled for surface and subsurface oil to estimate length of o mpled by digging about 8,000 pits to discover and quantify subsurfa on of a final report, and journal publications. No fieldwork is propos	elines within Prince William Sound i iled shoreline, area and volume of c ace oil. In FY 02, Phase III of this p ed for FY 02.	n FY 01. A s biled sedimen roject will be o	tratified rar t, and volu devoted to	ndom sample me of oil. Ap data and cho	e of shorelin oproximate emical anal	ne will ly 8 km lysis,
02556	Mapping Marine Habitats: The First Step in a Spatially Nested Monitoring Program	C. Schoch/Kachemak Bay Research Reserve	ADFG	New 1st yr., 1	yr. project	\$50.0	\$0.0
Groups, ir Bay, and o through tir coast to g physics of	ndividuals, and programs as diverse as natural resource agencies, GEM can benefit from a comprehensive, high resolution database me. At present, no such detailed database or monitoring program ather such habitat information in a cost-effective yet detailed mann f the environment to select replicate shore sites for monitoring alga	local governments, researchers, co of shoreline and nearshore habitats exists within the Gulf of Alaska. Th er. The method relies on a nested I and invertebrate diversity.	nservation ac , and from inf is project will hierarchical r	dvocates ir formation o use a met nearshore	n Cook Inlet a on the physic hod adopted classification	and Kacher al changes along the based on	nak seen US west the
02565	Bottom-Up vs. Top Down: What Forces Control Variability in Kachemak Bay?	C. Schoch/Kachemak Bay Research Reserve	ADFG	New 1st yr., 1	yr. project	\$49.9	\$0.0
This proje (current p understan research a	ect will establish intertidal and subtidal transects on rocky and sedin atterns, nutrient concentrations, phytoplankton distributions) and the nd the interaction of the nearshore oceanographic environment with and monitoring programs funded by the National Oceanic and Atm	nent shores in Kachemak Bay and v ne spatial patterns of adult population n coastal marine communities in the ospheric Administration in Kachema	will study the ns and their I Gulf of Alash ak Bay and w	relationshi arvae over ka. The pr ill adopt pr	p between be time. The p oject will par otocols deve	ottom-up co primary goa tner with ex loped by P	ontrols I is to disting ISCO.
02569	Linked Monitoring Network for the Gulf of Alaska: A Workshop	C. Schoch/Kachemak Bay Research Reserve, G. Eckert/L	ADFG JAS	New 1st yr., 1	yr. project	\$15.3	\$0.0
There are oceanic re workshop monitoring questions	excellent research models such as PICES and PISCO in the Lowe egime shifts on recruitment and growth of intertidal and shallow sub to bring together researchers from across the Gulf of Alaska regio g the neashore ocean of the North Pacific. A network of local resea at multiple spatial scales is envisioned.	er 48 that integrate oceanographic a otidal organisms. However, no such n and the U.S. west coast to develo arch organizations acting in concert	and shoreline n program exi op a coordinat to adopt star	componer ists in Alas ted resear ndardized p	nts to study ti ka. This pro ch program f protocols to a	he effects o ject will cor or research address res	of ivene a i and earch
02574-BAA	Assessment of Bivalve Recovery on Treated Mixed-Soft Beaches in Prince William Sound	D. Lees/Littoral Ecological & Environmental Services	NOAA	New 1st yr., 2	yr. project	\$94.8	\$35.3
Studies fro damaged conclusion beaches a The study	om 1989 through 1997 suggest that bivalve assemblages on beach in terms of species composition and function. This project will ass ns are accurate will indicate that a considerable proportion of mixed are functionally impaired in terms of their ability to support foraging will also provide insight into the need for remediation of beaches t	nes in Prince William Sound with hig less the generality of this apparent i d-soft beaches in treated areas of th by damaged nearshore vertebrate o restore biodiversity and function o	gh-pressure h njury to these ne sound rem predators suc on these asse	not-water w e assembla ains extrea ch as sea c mblages.	vashing rema ages. A findir mely disturbe otters and ha	ain severely ng that our ed and that rlequin duc	these ks.
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- Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02578	The Marine Macrofauna of Prince William Sound: An Annotated List	N. Foster, H. Feder	NOAA	New 1st yr., 1	yr. project	\$38.3	\$0.0
Data sets t as part of r EVOS stak	hat present basic taxonomic and biogeographic information at the severation on potential introductions of nonindigenous species. This precedential introductions of nonindigenous species.	pecies level for 1,645 animal specie project will make this important inform	s form Prir nation ava	nce William ailable to a	Sound have wider group	e been com of users, ir	ipiled icluding
02589-BAA	PWSRCAC - EVOS Long Term Environmental Monitoring Program	J. Devens/ PWSRCAC	NOAA	New 1st yr.		\$233.3	
This project Peninsula, mussel tiss efficiency in Council.	t will provide essential long-term baseline measurements of hydroca Kodiak, and Gulf of Alaska. The objective is to provide a more com sue that can be used to determine impacts of oil sources on the eco n hydrocarbon sampling and analysis that has been ongoing since 1	arbon levels and sourecs at program prehensive program for the collection system. This project will provide an 993 under the auspices of the Prince	n sites with on of base improved e William	in areas of line data in link to reco Sound Reg	Prince Willi subtidal sed very status a jonal Citizen	am Sound, iments and and greater s Advisory	Kenai I
02593	River Otters and Fishes in the Nearshore Environment: A Synthesis	S. Jewett/UAF	ADFG	New 1st vr. 2	vr. project	\$143.6	\$33.1
This project Social orga dependence synthesize beach-fring	ct will integrate data collected on river otters and fishes in Prince Wil anization and population dynamics of river otters, specialized fish-pro- ce of sociality in river otters on the availability of schooling fishes and the data on the effects of fish distributions on otter sociality with tha ge forests.	liam Sound, through efforts of the N edators, are dependent on abundan the contribution of intertidal/demen t on the effects of social communica	VP (/025), ce and ava sal fishes t ation of otte	APEX (/16 allability of t to the diet c ers on nutri	63), and SEA fishes. This of solitary otto ent transpor	(/320) pro project will ers, and ts from sea	iects. test the a to
02608	Permanent Archiving of Specimens Collected in Nearshore and Deep Benthic Habitats	N. Foster/UAF	ADFG	New 1st yr., 1	yr. project	\$111.8	\$0.0
This project environmend deep benth	ct will support acquisition and archiving of marine invertebrate specir ntal monitoring in Port Valdez between 1990 and 1995. Specimens nic communities. As a result of these efforts, there will be an improv	nens collected as part of EVOS ass represent a time series of samples red set of baseline data for the mari	essment s from eelgr ne biota of	tudies in P ass habitat Prince Wil	rince William s, kelp fores liam Sound.	i Sound an t habitats, i	d and
02639	Field Experiments for Testing Spill-Impacts Hypotheses from Long-Term Monitoring	G. Shigenaka/NOAA HAZMAT	NOAA	New 1st yr., 1	yr. project	\$71.5	\$0.0
NOAA initia tests the hy experiment recovery ha program, th National Es	ated two intertidal experiments in 2000 to test hypotheses concernin ypothesis that aggressive shoreline cleanup has caused unnatural lo t, in lower Herring Bay, tests the hypothesis that shoreline washing o as been delayed and infaunal communities are fundamentally altere hat program has ended. This project will permit annual sampling an stuarine Research Reserve and the lower Herring Bay project to alte	g long-term effects of oil spill cleans ong-term cycling in rocky intertidal co on oiled beaches physically alters gr d. Although both of these experimen d data collection while transitioning ernative funding support in 2003.	up. The fir communities ain size str nts were be the Kasitsr	st experime s, Fucus in ucture to tl egun under na Bay proj	ent, located i particular. he extent tha NOAA's lon ect to the Ka	n Kasitsna The second It biological g-term mol Ichemak B	Bay, I nitoring ay

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02644	Molecular Biomarkers as a New Technique for Assessing Physiological Contaminant Stress	G. Shigenaka/NOAA HAZMAT	NOAA	New 1st yr., 1	yr. project	\$114.1	\$0.0
This project biomarkers and lower (setting (and small boat	t has two primary objectives: first, a targeted evaluation/vali s) to assess extent and source of biological stress; and seco Cook Inlet to contaminant type (i.e., fuel oils or antifouling pa d particularly as a transitional bridge to GEM), but the work a harbors in Prince William Sound and lower Cook Inlet.	dation of new monitoring technology (based and, the linking of stress in mussels inhabitin aint components). The monitoring tool has th as proposed will provide useful information o	on the me g small bo he potentia on the biolo	easurement at harbor a al for applic ogical statu	t of a series o areas in Princ cation beyond is of mussels	of molecula ce William d this speci s residing ir	ar Sound ific n six
02646-BAA	Information Dissemination through the Web: Developing Interactive Database on Southcentral Alaskan Seaweeds	an M. Stekoll/UAS	NOAA	New 1st yr., 3	yr. project	\$58.0	\$37.5
The macro animals an In order to With this a The websit	benthic marine algae or seaweeds are an integral compone of have long been used as part of the diet of indigenous peo begin to overcome this problem, this project will produce a s a reference, the project will query Alaska Native communit te will develop incrementally as species are added and comm	nt of Alaska's nearshore ecosystem. They a ples. Surprisingly, the correct identification Web-based database of algal images and di ties for information on the traditional uses of ments from users are incorporated. [Note: T	are the bas of most alg stributions the specie his project	se of the fo gal species that will fa es and add also reque	od chain for is still elusiv cilitate speci this data to ested \$26.9 f	many mari ve to many es identific the final pr or FY 04.]	ne people. ations. oduct.
02652	Links Between Persistent Oil in Mussel Beds and Predate	ors S. Rice/NOAA, T. Dean/Coastal Resources Associates, S. Jewett/ UAF	NOAA	New 1st yr., 2	yr. project	\$51.1	\$27.1
Links betw Significant vertebrate future mon persistence	een oil-contaminated mussel beds and impacts on infauna a oil concentrations in some mussel beds have persisted to p predator exposure to oil. The possibility that oiled beds are itoring and response decisions in the event of future spills. e of <i>Exxon Valdez</i> oil in mussel beds, infauna, and in nearsh	and vertebrate predators have been inferred resent, much longer than originally expected long-term sources of vertebrate contaminati In a more holistic approach than in the past, hore vertebrate predators.	, but have d, and may ion was ur this proje	not been o explain co anticipated ct will exan	lefinitively de ontemporary d and has im nine evidence	monstrate observatio plications f e for links l	d. ns of or between
02656	Retrospective Analysis of Nearshore Marine Communitie Based on Analysis of Archaeological Material and Isotope	G. Irvine/USGS, J. Schaaf/NPS	DOI	New 1st yr., 2	yr. project	\$98.6	\$18.0
This project analyses. Changes ir habitat cha periods of	t will investigate long-term (6,300 year) patterns of productive These analyses will focus on excavated midden remains of a nearshore marine communities will be assessed through e anges. Isotopic analysis of shells will provided an assessme climate change.	vity and relative species abundances in near very rich, well-dated archaeological sites alo examination of relative species abundances, nt of long-term productivity patterns in the ne	shore, inte ong the Ka size-frequ earshore n	ertidal com tmai Natior ency analy narine envi	munities via nal Park and vsis, and othe ironment as	retrospecti Preserve o er indicator related to r	ve coast. s of najor



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02657	Analysis of Genomic Stress Response in Sea Otters	C. Mohr, J. Stott/UC Davis, B. Ballachey/USGS	DOI	New 1st yr., 1	yr. project	\$43.5	\$0.0
In summ project w metabolic differentia understa	er 2001, as part of Project 01423, sea otters will be captured in a ill complement Project 01423, by applying novel, highly sensitive c processes in the sea otter. The project will characterize and c al expression of a suite of key genes that are indicators of immu- nding of the status of recovery of sea otters in western Prince W	oiled and unoiled areas of Prince William e molecular techniques for the measurem ompare the genomic stress response in p nological, cellular, and metabolic respons (illiam Sound, and physiological factors th	Sound for a ent of healt peripheral t ses to stres at may be i	assessmer h status, to plood mono s. The res nvolved in	nt of CYP1A oxicant expo- onuclear cells ults of the st constraining	levels. Thi sure, and s by examin udy will ent recovery.	s ning the nance
02662	Natural Life Restoration by Manulipitation	J. Rusher/Rusher's Services	ADEC	New 1st yr., 1	yr. project	\$103.0	\$0.0
This projection oil is in the accelerate	ect will place bait in pits of beaches and sensitive areas where w the process of degrading by the movement of worms in the beach the degradation of oil.	veathered oil may remain. Quality control n. The toxicity of weathered oil will also be	testing of t e identified	he bait wor . This bait	uld be done manulipitatio	to tell if weat on of worm	athered s could
02663	"Watchdog Tool" for Sampling and Monitoring	J. Rusher/Rusher's Services	ADEC	New 1st vr., 1	vr. project	\$180.9	\$0.0
A sampli testing of weathere	ng tool called the "Watchdog Tool" will be placed on surface or p f the "Watchdog Tool" will be done to tell if weathered oil is leach ed oil.	bits of beaches and sensitive areas where ning out or coming in from subtidal areas.	e weathered This proje	d oil may b ct will also	e leaching ou identify the f	ut. Quality toxicity of	control
Seabird/Fo	prage Fish and Related Projects				\$109.0	\$940.6	\$297.2
02144	Common Murre Population Monitoring	D. Roseneau/USFWS	DOI	Cont'd 7th yr., 7	\$14.0 yr. project	\$14.8	\$0.0
FY 02 will of analyz murre po the spill a	Il provide close-out funds for this project, which will census the C ing the data collected during FY 01 and comparing these results pulation count data (e.g., from the Barren Islands), and writing a area.	Chiswell Islands murre colonies during the with previous postspill population counts a final report discussing the recovery statu	FY 01 field , running a is of murre	d season. power ana s at this inj	The close-ou alysis using t ured nesting	ut work will hese and o location ar	consist ther nd in
02159	Surveys to Monitor Marine Bird Abundance in Prince Willian Sound During Winter and Summer 2002	m D. Irons/USFWS	DOI	Cont'd 9th yr.	•	\$194.1	\$25.0
This proju- previous from sum ducks are murres a througho \$25,000 t	ect will conduct small boat surveys to monitor abundance of mai surveys have monitored population trends for 65 bird and 8 mar amer 1989-2002 and winter 1990-2002. Data collected in 2000 i e increasing in the oiled area in winter, and black oystercatchers re showing no trend in the oiled area; pigeon guillemots and ma ut the sound. Results of these surveys through 1998 have beer for FY 04.]	rine birds and sea otters in Prince William ine mammal species in the sound. Data indicate that bald eagles are increasing in are increasing thoughout the sound in su rbled murrelets are declining in the oiled in published by Irons et al. (2000) and Land	a Sound du collected ir winter and ummer. Co areas of the ce et al. (20	ring March 1 2002 will 1 summer t 1 summon loo 2 sound an 201). [Note	and July 200 be used to e hroughout th ns, cormorar d Kittlitz's mo e: This project	02. Seven xamine tre le sound, h nts, and co urrelet is de ct also requ	nds arlequin mmon eclining iested

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Proj.No.	Project Title	Proposer	Lead Agenc	New or y Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02163-BAA	Alaska Predator Ecosystem Experiment in Prince Willia Sound and the Gulf of Alaska (APEX)	n D. Duffy/Paumano	k Solutions NOA	A Cont'd 9th yr., 9	\$20.0 9 yr. project	\$31.1	\$0.0
This projec Inlet, comp calibrate se from the oi	et will fund a third closeout year for Project /163, which used paring their reproductive and foraging biologies, including di eabird performance with fish distribution and abundance. T I spill. In FY 02, the project leader will prepare a semi-pop	seabirds as probes of the tro et. These measurements we his allowed a determination t lar account of the results and	phic (foraging) environr re compared with hydro nat food played a major implications of the proj	nent of Prind acoustic, ae role in limitir act.	ce William So rial, and net s ng the recove	ound and C campling of ry of seabi	ook fish to ds
02163M	Numerical and Functional Response of Seabirds to Fluctuations in Forage Fish Density	J. Piatt/USGS	DOI	Cont'd 9th yr., 9	\$0.0 9 yr. project	\$82.5	\$0.0
This project data on sea oceanogra	et will fund preparation of synthesis manuscripts for this cor abird survival and stress continuing in 2000-2001. The wo phy, while measuring aspects of seabird breeding biology a	ponent of the APEX project. k involved at-sea surveys for nd foraging behavior at adjac	The main field program forage fish and seabird ent colonies.	occurred in s and some	1995-1999, characteriza	with collect tion of	ion of
02434	Design of a Video System for Remotely Monitoring Seal East Amatuli Island	irds at A. Kettle/USFWS	DOI	New 1st yr., 2	2 yr. project	\$4.3	\$1 . 1.
During the is possible to the East design req	1990's, rough seas at East Amatuli Island have occasiona that in the future weather patterns could compromise data Amatuli field camp. This could augment field observations uirements for such a system, research and price available	y blocked access to cliff plots sets. Recently developed tec and allow safe data collectic components, and determine t	where seabird breeding hnology makes it possib n to continue through pe ne price for contractual	g and popula le to transm priods of rou system desig	ation size data it video image gh seas. Thi gn and assen	a are collectes of the cl s project w nbly.	:ted; it iff plots ill
02479	Effects of Food Stress on Survival and Reproductive Performance of Seabirds	J. Piatt/USGS-BRI Kitaysky/Univ. of V	D, A. DOI Vashington	Cont'd 4th yr., 4	\$75.0 4 yr. project	\$75.0	\$0.0
Traditional project will hormones restraint.	field methods of assessing effects of fluctuations in food s apply an additional tool the measure of stress hormones such as corticosterone in the blood of seabirds, or the rise These techniques will be applied to seabirds breeding in low portunity for a concurrent field and captive study of stress in	Ipply on the survival and repr in free-ranging seabirds. Fo n blood levels of corticostero rer Cook Inlet and captive bin seabirds.	oductive performance o od stress can be quantif ne in response to a stan ds will be used for contro	f seabirds m ied by meas dardized str olled experin	ay give equiv suring base le essor captu nents. This p	vocal result vels of stre ure, handlir project prov	s. This ss ig and ides a
02561	Evaluating the Feasibility of Developing a Community- E Forage Fish Sampling Project for GEM	ased D. Roseneau/USF	WS DOI	New 1st yr., 2	2 yr. project	\$54.3	\$11.6
This project populations help asses are favorate sand lance	et is based on the recently completed APEX project's 5-yea s. The project will monitor long-term trends in forage fish p is and understand the types and levels of community partic ole, the information can be used to begin designing cost-effect stocks in the Kachemak Bay/lower Cook Inlet, Resurrection	pilot study that used stomac opulations in several regions pation that may be available ective, community-based for n Bay, Kodiak Island, and Pri	h contents from sport-ca of the spill area during G or long-term forage fish ge fish monitoring studi nce William Sound regio	ught halibut EM. The p monitoring es to track lo ons.	t to sample fo roject will pro studies. Also ong-term tren	rage fish vide inform , if project ds in capel	ation to results in and

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INDEX OF PROPOSALS BY ROURCE CLUSTER -- FY 02

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02634	Expanding the Seabird Tissue Archival and Monitoring Project (STAMP) Program for GEM	D. Roseneau/USFWS, G. York/BRD, P. Becker/NIST	DOI	New 1st yr., 1	yr. project	\$54.9	\$0.0
This proje local com logistical p long-term	ct will lay the ground work for expanding the Seabird Tissue Archimunity networks for collecting samples for the project, adding more plans for expanding STAMP in the Gulf of Alaska, and completing monitoring plan for GEM.	val and Monitoring Project (STAMP) in e seabird colony locations and specie analytical work on existing samples to	n the spill an s to the exist provide a c	rea. The pr sting STAM database th	roject will inc IP program, nat will be us	lude develo developing ed to desig	oping n a
02659	Preparation and Publication of Results from SEA and NVP Avian Predation Studies	M. Bishop/ PWSSC	NOAA	New 1st yr., 1	yr. project	\$29.7	\$0.0
This proje work from publication	ct will prepare (a) two manuscripts based on the work from the Av the Avian Predation on Blue Mussels study (Project /025). The th n on avian consumption of herring spawn is currently in press in <i>Fi</i>	ian Predation on Herring Spawn stud nree manuscripts will be submitted to isheries Oceanography.	y (Project /3 peer review	20) and (b) ed journals) one manus for publicat	cript based ion. One	on the
02664	Retrospective Analysis of 30 Years of Seabird Distribution and Diet Data	J. Piatt/USGS	DOI	New		\$287.6	\$230.0
seabirds a in Alaska will compi foundatior also reque	are excellent indicators of change in the marine environment. And have been gathered at great expense over the past 30 years, but i le some historical seabird data sets and create accessible data and n for future studies, and to test some basic hypotheses about the e ested funding (\$120,000) for FY 04.]	enormous amount of data on the abu most of it has not been analyzed beyo chives as a tool for assessing past an effects of regime shifts on diet and dis	ndance, dis and the scal d future hui tribution of	tribution an e at which man impac seabirds in	id dietary ha it was gathe ts on seabire Alaska. [No	bitats of se red. This p ds population ote: This pr	abirds roject ons, a oject
02673	Continuing Decline of Pigeon Guillemots in the Oiled Portion o Prince William Sound	f D. Irons/USFWS, D. Roby/OSU	DOI	New 1st yr., 5	yr. project	\$28.7	\$29.5
Pigeon gu together p guillemots predation, requested	illemots have declined 56% in Prince William Sound since the Exp igeon guillemots have declined 88% since 1972, and the decline is in Prince William Sound. From previous work we suspect one or or continuing oil effects. The first year the study will focus on food funding for FY 04 (\$30,500), FY 05 (\$31,500), and FY 06 (\$32,50	xon Valdez oil spill. This is compound s continuing. This project will investig more of three major factors are caus d and predation, as analyses for oil ef 00).]	led on a 73 jate factors ing the decl fects is mor	% decline f that are ca line: reduce re expensiv	rom 1972 to using the co ed prey base /e. [Note: Th	1989. Tak ntinued dec , increased is project a	ten Sline of I Iso
02674-BAA	Assessing Pigeon Guillemot Restoration Techniques and Feathers as Biomonitors	J. French/Pegasus Enterprises, Divoky/UAF	G. NOAA	New 1st yr., 2	yr. project	\$83.6	
This proje feathers a Center wil gulf will be web will be	ct will (a) monitor pigeon guillemot restoration projects initiated be is indicators of ecosystem variability and contamination. Censuses I be conducted and the occupancy and success of artificial nest si e visited to assess the reason for their attractiveness to guillemots. e examined through isotopic and trace metal analysis of recently c	tween 1998-2000 and (b) conduct a p s of Resurrection Bay to determine su tes erected in the Gulf of Alaska will b . Temporal and geographical variatio collected pigeon guillemot feathers.	preliminary e urvivorship c be mo ni tore n in the stru	examination of birds fled d. Establis locture and c	n of the utility iged form the hed man-ma contaminatio	y of guillem e Alaska Se ade colonie n of the gu	ot ∋aLife s in the If food

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
Archaeolo	gical Resources	· · · · · · · · · · · · · · · · · · ·			\$29.1	\$29.1	
02154	Archaeological Repository, Display Facilities, and Exhibits for Prince William Sound and Lower Cook Inlet	J. Bittner/ADNR	ADNR	Cont'd	\$29.1	\$29.1	
In Januar Iower Co Council's managen	ry 1999, the Trustee Council authorized \$2.8 million for a grant to 0 ok Inlet, local display areas in seven communities in those regions intent to provide a reasonable amount of funding for project mana nent and GA funds for FY 02. [Detailed Project Description and but	Chugachmiut, Inc. to develop an archae, and traveling exhibits to display in the gement and agency general administra udget not yet provided; expected FY 02	eological re local facili ation (GA). cost is \$29	pository for ties. The re This proje 9,100.]	r Prince Willi esolution als ct will provid	am Sound o states the e project	and ∋
Subsisten	ce				\$419.1	\$1,468.7	\$772.1
02052	Community Involvement Planning for GEM	P. Brown- Schwalenberg/CRRC	ADFG	Cont'd 8th yr., 8	\$180.0 yr. project	\$241.2	\$0.0
In FY 02, Kodiak Is project w three obj program,	this project will continue to actively involve residents of Tatitlek, C sland Region/Ouzinkie, and the Alaska Peninsula Region/Chignik L ill work to address the future of community involvement with regard ectives: (a) designing a community based research and monitoring and (c) developing possible pilot projects for FY 03.	henega Bay, Port Graham, Nanwalek, ake in the restoration program through d to the Gulf Ecosystem Monitoring (G g program, (b) identifying specific resea	Cordova/E a network EM) progra arch and m	yak, Sewar of local fac m. In FY 0 onitoring ac	d/Qutekcak, cilitators. In 2, the projectivities that f	Seldovia, addition, th t will focus t within the	Valdez, e ⊱on ∋ GEM
02210	Youth Area Watch	R. DeLorenzo/Chugach School District	ADFG	Cont'd 7th yr., 7	\$96.3 yr. project	\$96.8	\$0.0
This proj restoratic principal plan and Seldovia,	ect links students in the oil spill impacted area with research and mon process and provides these individuals the skills to participate in investigators who have indicated interest in working with students. is a positive community investment in that process. Participating of Seward, Valdez, and Whittier.	nonitoring projects funded by the Truston restoration now and in the future. You Youth Area Watch fosters long-term of communities in FY 02 will be Tatitlek, C	ee Council. uth conduc commitmer Chenega Ba	The proje t research i at to the goa ay, Cordova	ct involves s dentified and als set out in a, Nanwalek,	tudents in delegated the restora Port Grah	ihe J by ation am,
02247	Kametolook River Coho Salmon Subsistence Project	J. McCullough, L. Scarbrough/ADFG	ADFG	Cont'd 6th yr., 6	\$28.0 yr. project	\$34.0	\$0.0
Subsister the oil sp will provid boxes we into the k investiga	nce users from the Alaska Peninsula Native Village of Perryville ha ill. Criminal settlement funds were used in FY 96 to determine wha de funding through FY 02 for the Alaska Department of Fish and G ere installed in the upper reach of the Kametolook River. In 1998, Kametolook River system, the project will be unable to achieve the te nearby coho stocks as potential brood sources for rehabilitation	we noted significant declines in the col- at method would best restore the river! ame to try conservative and safe resto 1999, and 2000 holding pens were also goal of restoration within two life cycles of the Kametolook coho run.	no salmon r s coho saln ration metho used. Du s of the fish	run in the n non stock to nods. In 19 e to continu . In FY 01,	earby Kame o historic lev 197, two instr ual low esca the project	tolook Rive els. This p eam incub pement of will expanc	r since roject ation coho I to

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•			Lead	New or	FY02	FY02	FY 03
Proj.No.	Project Title	Proposer	Agency	Cont'd	Expected	Request	Request
02256B	Sockeye Salmon Stocking at Solf Lake	D. Gillikin/USFS	USFS	Cont'd 7th yr., 7	\$20.0 yr. project	\$20.0	\$4.5
This proje Solf Lake access to reconstruc evaluate th	ct will benefit subsistence users of western Pr to support a sustainable population of sockey the lake for returning adult salmon. The stock ction of the fishway in the eastern channel was the improvements. [Note: This project, original	ince William Sound. There are two phases to the project. Fe salmon. Phase 2 included stocking the lake with approxing tring program began in 1998 along with modification to the test completed in the summer of 2000. Returning adult salmonally scheduled to closeout in FY 02, is now requesting funds	Phase 1, w nately 100 wo outlets n to Solf L in FY 03	which begar 0,000 socket to control v ake will be (\$4,500).]	n in FY 96, v eye salmon f water levels. monitored s	erified the a ry, then ens The tarting in 20	ibility of suring)01 to
02333	Sea Otter Monitoring	B. Henrichs/Native Village of Eyak	DOI	New		\$100.0	\$100.0
				1st yr., 5	yr. project		
The sea o some mor Descriptio	tters in Orca Inlet have been dying and washin hitoring to find a way to prevent these needles n and budget will need to be prepared. Fundi	ng up on the beaches the past few years. The problem is g s deaths. [Note: This proposal was submitted as an idea; ng (\$100,000 each year) has also been requested for FY 0	etting wor f recomm 4, FY 05, a	se. We kn ended for fr and FY 06.]	ow the caus unding, a De	e. We nee etailed Proje	d to do ect
02372	Steller Sea Lion Monitoring	B. Henrichs/Native Village of Eyak	DOI	New		\$250.0	\$250.0
				1st yr., 5	yr. project		
Steller sea will be cur fund this li Funding (S	a lions are on the decline and have been place tailed and some traditional areas may be clos nteraction. [Note: This proposal was submitte \$250,000 each year) has also been requested	ed on the endangered list. If this trend continues, subsisten ed. We need to monitor the interaction between the Steller d as an idea; if recommended for funding, a Detailed Proje for FY 04, FY 05, and FY 06.]	ce fishing sea lion a ct Descrip	for salmon and the fish tion and bu	, herring and ing fleets. T idget will nee	d other mar his proposi ed to be pre	ine life al would pared.
02401	Assessment of Spot Shrimp Abundance ir Sound	n Prince William C. Hughey/ Valdez Native Tribe, C O'Clair/ NOAA	. NOAA	Cont'd 4th yr., 4	\$33.0 yr. project	\$27.2	\$0.0
This proje Alaska De Departme taken plac greater in Fish and C	ct is estimating the abundance of spot shrimp epartment of Fish and Game surveys to detern nt of Fish and Game in 1999 and 2000 indicat be between 1992 to 1998, and a slight increase 2000. FY 02 will fund close out, produce mar Game.	and determining the structure of the spot shrimp population nine whether the spot shrimp population is recovering from the a cessation in the apparent decline of spot shrimp abund the in the number and weight of spot shrimp per pot in 1999 of nuscripts, and provide input into the development of a shrim	n in Prince depletion. ance in we compared p manage	William Se Project re estern Prine to 1998. T ment plan	ound. It aug sults and th ce William S he increase with the Alas	ments curr ose of the A ound that h was marke ska Departi	ent Naska Iad Idly ment of
02416	O'Brian Creek Enhancement	Chenega Bay IRA Council	USFS	New		\$64.2	\$0.0
				1st yr., 1	yr. project		
Currently s the numer series of d cutthroat t recreation	several stream habitat constraints exist within ous fish species that use the habitat as well a lam and fish ladder structures. Species that p rout. A self-sustaining limited subsistence use	O'Brian Creek which is located near the village of Chenega s the entire local ecosystem. The main goal of the project opulate the stream include pink salmon, chum salmon, col e fishery would be priceless for the community, as well as a	a Bay. Imp is to increa no salmon idding pote	provements ase the dep , sockeye s ential for pr	to the strea oth of water l almon, Dolly omoting tou	m would be by creation y Varden, a rism and	enefit of a nd

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02503 Orca Inlet Restoration B. Henrichs/Native Village of Eyak DOI New Ist yr., 5 yr. project Orca Inlet has become barren over the years. While it used to supply many of the subsistence resources to the residents of Eyak/Cordova, in recent y supplied very little. The 1984 earthquake raising the area resulted in a die-off of clams and crab. The expanding of the sea otters accelerated this. The inite combined with the increase of fish waste dumped has resulted in a dead bay. We need to come up with a plan to restore Ocra Inlet o what it were children. [Note: This proposal was submitted as an idea; if recommended for funding, a Detailed Project Description and budget will need to be prefunding (\$150,000 each year) has also been requested for FY 04, FY 05, and FY 06.] 02507 Nuchek Subsistence Camp B. Henrichs/Native Village of Eyak DOI New Ist yr., 1 yr. project As a result of the oil spill the availability of subsistence foods have changed. The residents of the spill region are spending more time gathering traditic foods. A subsistence camp at Nuchek would allow the youth and elders to address these changes. Many of the people in the region trace their ances Nuchek. As Chugach Alaska Corporation has built a facility at Nuchek and holds annual spirit camps, this would be an appropriate location for this sut [Note: This proposal was submitted as an idea; if recommended for funding, a Detailed Project Description and budget will need to be prepared.] 02610 Kodiak Archipelago Youth Area Watch T. Schneider/Kodiak Island Borough School District ADFG Cont'd \$61.8 3rd yr., 3 yr. project This project will local experts and document	FY02 F Request Re	FY02 FY03 equest Reque
Orca Inlet has become barren over the years. While it used to supply many of the subsistence resources to the residents of Eyak/Cordova, in recent y supplied very little. The 1964 earthquake raising the area resulted in a die-off of clams and crab. The expanding of the sea otters accelerated this. The indet combined with the increase of fish wase dumped has resulted in a dead bay. We need to come up with a plan to restore Ocra Inlet to what it were children. [Note: This proposal was submitted as an idea; if recommended for funding, a Detailed Project Description and budget will need to be preventing (\$150,000 each year) has also been requested for FY 04, FY 05, and FY 06.] 02507 Nuchek Subsistence Camp B. Henrichs/Native Village of Eyak DOI New Ist yr., 1 yr. project As a result of the oil spill the availability of subsistence foods have changed. The residents of the spill region are spending more time gathering traditic foods. A subsistence camp at Nuchek would allow the youth and elders to address these changes. Many of the people in the region trace their ances Nuchek. As Chugach Alaska Corporation has built a facility at Nuchek and holds annual spirit camps, this would be an appropriate location for this sul [Note: This proposal was submitted as an idea; if recommended for funding, a Detailed Project Description and budget will need to be prepared.] 02610 Kodiak Archipelago Youth Area Watch T. Schneider/Kodiak Island ADFG Cont'd \$61.8 Borough School District 3rd yr., 3 yr. project This project will engage students in projects with goals aligned with the general restoration efforts of the Trustee Council. Students and site coordinate interviews with local experts	\$100.0	\$100.0 \$15
02507 Nuchek Subsistence Camp B. Henrichs/Native Village of Eyak DOI New 1st yr., 1 yr. project As a result of the oil spill the availability of subsistence foods have changed. The residents of the spill region are spending more time gathering traditic foods. A subsistence camp at Nuchek would allow the youth and elders to address these changes. Many of the people in the region trace their ances Nuchek. As Chugach Alaska Corporation has built a facility at Nuchek and holds annual spirit camps, this would be an appropriate location for this sul [Note: This proposal was submitted as an idea; if recommended for funding, a Detailed Project Description and budget will need to be prepared.] 02610 Kodiak Archipelago Youth Area Watch T. Schneider/Kodiak Island Borough School District ADFG Cont'd \$61.8 3rd yr., 3 yr. project This project will engage students in projects with goals aligned with the general restoration efforts of the Trustee Council. Students and site coordinate interviews with local experts and document traditional ecological knowledge, publishing it in a District oral history magazine. Participation of Youth Are and students in the annual Academy of Elders/Science Camp will be strongly recommended. Such participation will serve as another avenue for more to learn about restoration efforts, scientific monitoring techniques, and occupations related to such work. The value and implications of traditional ecol knowledge will be strongly emphasized throughout the implementation of the project. 02669 Hooligan Research B. Henrichs/Native Village of Eyak DOI New 1st yr., 2 yr. project The Alaska Department of Fish and Game	years it has The shallowing it was when w prepared.	ears it has le shallowing of was when we prepared.
1st yr., 1 yr. project As a result of the oil spill the availability of subsistence foods have changed. The residents of the spill region are spending more time gathering traditic foods. A subsistence camp at Nuchek would allow the youth and elders to address these changes. Many of the people in the region trace their ances Nuchek. As Chugach Alaska Corporation has built a facility at Nuchek and holds annual spirit camps, this would be an appropriate location for this sul [Note: This proposal was submitted as an idea; if recommended for funding, a Detailed Project Description and budget will need to be prepared.] 02610 Kodiak Archipelago Youth Area Watch T. Schneider/Kodiak Island Borough School District ADFG Cont'd \$61.8 3rd yr., 3 yr. project This project will engage students in projects with goals aligned with the general restoration efforts of the Trustee Council. Students and site coordinate interviews with local experts and document traditional ecological knowledge, publishing it in a District oral history magazine. Participation of Youth Are and students in the annual Academy of Elders/Science Camp will be strongly recommended. Such participation will serve as another avenue for more to learn about restoration efforts, scientific monitoring techniques, and occupations related to such work. The value and implications of traditional ecol knowledge will be strongly emphasized throughout the implementation of the project. 02669 Hooligan Research B. Henrichs/Native Village of Eyak DOI New 1st yr., 2 yr. project The Alaska Department of Fish and Game has been selling permits to harvest hooligan commercially for	\$125.0	\$125.0 \$
As a result of the oil spill the availability of subsistence foods have changed. The residents of the spill region are spending more time gathering traditic foods. A subsistence camp at Nuchek would allow the youth and elders to address these changes. Many of the people in the region trace their ances Nuchek. As Chugach Alaska Corporation has built a facility at Nuchek and holds annual spirit camps, this would be an appropriate location for this sul [Note: This proposal was submitted as an idea; if recommended for funding, a Detailed Project Description and budget will need to be prepared.] 02610 Kodiak Archipelago Youth Area Watch T. Schneider/Kodiak Island Borough School District ADFG Cont'd \$61.8 3rd yr., 3 yr. project This project will engage students in projects with goals aligned with the general restoration efforts of the Trustee Council. Students and site coordinate interviews with local experts and document traditional ecological knowledge, publishing it in a District oral history magazine. Participation of Youth Area and students in the annual Academy of Elders/Science Camp will be strongly recommended. Such participation will serve as another avenue for more to learn about restoration efforts, scientific monitoring techniques, and occupations related to such work. The value and implications of traditional ecol knowledge will be strongly emphasized throughout the implementation of the project. 02669 Hooligan Research B. Henrichs/Native Village of Eyak DOI New 1st yr., 2 yr. project The Alaska Department of Fish and Game has been selling permits to harvest hooligan commercially for the past two years. We are concerned becau tell us what the biomass is. Hooligan are a traditional subsistence food and a forage food for bir		
This project will engage students in projects with goals aligned with the general restoration efforts of the Trustee Council. Students and site coordinate interviews with local experts and document traditional ecological knowledge, publishing it in a District oral history magazine. Participation of Youth Are and students in the annual Academy of Elders/Science Camp will be strongly recommended. Such participation will serve as another avenue for more to learn about restoration efforts, scientific monitoring techniques, and occupations related to such work. The value and implications of traditional ecol knowledge will be strongly emphasized throughout the implementation of the project. 02669 Hooligan Research 02669 B. Henrichs/Native Village of Eyak DOI New 1st yr., 2 yr. project The Alaska Department of Fish and Game has been selling permits to harvest hooligan commercially for the past two years. We are concerned becautell us what the biomass is. Hooligan are a traditional subsistence food and a forage food for birds, fishes and marine mammals, including Steller sea have been no commercial herring openers in years, because they have been over fished. It doesn't make sense to start a commercial fibery on hooligan commercial fibery on hooligan sense to start a commercial fibery on hooligan commercial fibery on hooligan sense to start a commercial fibery on hooligan and a forage food for birds, fishes and marine mammals, including Steller sea have been no commercial herring openers in years, because they have been over fished. It doesn't make sense to start a commercial fibery on hooligan and the project are provided to proper to recommercial fibery on hooligan and the project is a donal to be a doeled.	ubsistence ca \$128.3	\$128.3 \$5
02669 Hooligan Research B. Henrichs/Native Village of Eyak DOI New 1st yr., 2 yr. project The Alaska Department of Fish and Game has been selling permits to harvest hooligan commercially for the past two years. We are concerned becau tell us what the biomass is. Hooligan are a traditional subsistence food and a forage food for birds, fishes and marine mammals, including Steller sea have been no commercial herring openers in years, because they have been over fished. It doesn't make sense to start a commercial fishery on hoolig	itors will condu ea Watch adu re tribal memb ological	ers will conduct a Watch adults tribal members ogical
1st yr., 2 yr. project The Alaska Department of Fish and Game has been selling permits to harvest hooligan commercially for the past two years. We are concerned becau tell us what the biomass is. Hooligan are a traditional subsistence food and a forage food for birds, fishes and marine mammals, including Steller sea have been no commercial herring openers in years, because they have been over fished. It doesn't make sense to start a commercial fishery on hoolig commercial fishery on booligan to accust the start a commercial fishery on hoolig	\$100.0	\$100.0 \$10
The Alaska Department of Fish and Game has been selling permits to harvest hooligan commercially for the past two years. We are concerned becau tell us what the biomass is. Hooligan are a traditional subsistence food and a forage food for birds, fishes and marine mammals, including Steller sea have been no commercial herring openers in years, because they have been over fished. It doesn't make sense to start a commercial fishery on hoolig commercial fishery on eacling a table of these starks. This project proposed in the past is a deplation of these starks.		
harvest and still maintain the stocks for traditional subsistence harvest. [Note: This proposal was submitted as an idea; if recommended for funding, a Project Description and budget will need to be prepared.]	ause they can a lions. There ligan, when th a commercia a Detailed	ise they cannot lions. There gan, when the a commercial Detailed

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Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request		
02677	English Bay River Sockeye Salmon Enumeration Project		C. Kvasnikoff/Nanwalek IRA Council	ADFG	New 1st yr., 2	yr. project	\$182.0	\$109.9		
This proje scarce and returns. T Fish and C equipmen	ct will allow for improvements to and continuation of smolt and d the Nanwalek Salmon Enhancement Project has been forced he enumeration of out-migrating smolts and returning adult so Game area management staff but without additional funding, th t and monitoring technology to enable more consistent and acc	adult d to na ckeye nese ir curate	sockeye enumeration in the Engli arrow its focus to absolutely essen escapement is very important to mportant tasks will not be able to c e data collection.	sh Bay River itial compone village projec continue. Thi	drainage. nts of the t personne s project w	Available fur project that re and Alaska vill help to imp	nds have b esult in adu Departme prove the v	ecome ult nt of veir		
Habitat Imp	rovement						\$185.6	\$0.0		
02612	Detecting and Understanding Marine-Terrestrial Linkages i Kenai River Watershed	in the	W. Hauser/ADFG	ADFG	New 1st yr., 1	yr. project	\$44.6	\$0.0		
This proje terrestrial salmon ar anthropog be cascad salmon ar	ct will provide matching funds for a coordinator to serve a mult nutrient cycling in the Kenai River watershed. The oil spill curt ad other species, in addition to allowing a massive input of mar enic activities including habitat degradation, increased utilization ling impacts when marine derived nutrients normally supplied to e withdrawn, productivity of the entire watershed is expected to	idiscip ailed ine nu on and oy sal o be d	plinary team of agency-supported commercial fishing on the river in utrients born by the unharvested sa d invasive species. Studies on wa mon carcasses are diverted from a liminished.	scientists tha 1989, causin almon. The v atersheds of an ecosysten	t is design g changes watershed the Pacific n. When n	ing a study o in productivi is also at sor Northwest s utrients norm	f marine ar ties of sock ne risk fror uggest the nally suppli	nd keye n re may ed by		
02621	Kenai River Flats Conservation Easement and Public Educ	cation	M. Kuwada/ADFG	ADFG	New	vr. project	\$141.0	\$0.0		
This project will protect approximately 600 acres of wetlands on the Kenai River Flats near the city of Kenai. The acquisition of a conservation easement for the property and construction of a boardwalk will protect sensitive coastal wetlands, high value waterfowl habitat, and two anadromous fish streams, and will provide new educational and recreational opportunities for the public. The conservation easement will be purchased by the Conservation Fund using already-approved funds from a North American Wetland Conservation Act grant. The easement will specify that the property be preserved in a natural state and protected against incompatible development. A boardwalk and viewing platform will be constructed using EVOS funds to proved recreational birdwatching and educational opportunities. The boardwalk and viewing platform are essential for obtaining the City's support for the conservation easement.										
Habitat Pro	tection		1999 - J.S.,							
02126 This projecture outside of	Habitat Protection and Acquisition Support ct will cover certain expenses incurred by Trustee agencies in the regular FY 02 work plan of research, monitoring, and gene	receiv eral re	ving title to parcels acquired by the storation projects. Detailed Project	Trustee Cou	Cont'd uncil. [Noto and budg	e: This proje let not yet pro	ct will be fu ovided.]	unded		
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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
Ecosystem S	Synthesis/GEM Transition	9-19-19-19-19-19-19-19-19-19-19-19-19-19	<u></u>		\$340.0	\$3,025.2	\$813.0
02340	Toward Long-Term Oceanographic Monitoring of the Gulf of Alaska Ecosystem	T. Weingartner/ UAF	ADFG	Cont'd 5th yr., 4	\$0.0 yr. project	\$20.7	\$0 .0
FY 02 will f the GAK 1 manuscript efforts inclu	fund completion of the final report for this multi-year project. The mooring is to be continued under the GEM program). After complet will focus on freshwater variations on the Gulf of Alaska shelf, and uded in previous annual reports.	fourth year of measurements will b pletion of the data collection phase, nd will synthesize the data collected	e completed in , a final report d under this pr	n Septemb and manus oject with s	er 2001 (or E script will be some of the r	December 2 prepared. etrospectiv	2001 if The ′e
02360-BAA	The Exxon Valdez Oil Spill: Guidance for Future Research Activities	C. Elfring/Polar Research Boa NRC	rd, NOAA	Cont'd 3rd yr., 3	\$90.0 8 yr. project	\$90.1	\$0.0
scope, con Monitoring draft Resea missions, g The comm the expecta in June and expected to	Intert, and structure of the Trustee Council's two GEM (Gulf Ecosy Plan. To date, the committee has provided guidance in two docu arch & Monitoring Plan would be developed and a February 2001 goals, administration, scale, data management, and community in ittee's next and final task will be to prepare a final report analyzin ations of the Trustee Council. This task will be conducted when t d hold a meeting to begin our review June 14-15, 2001. The corr o go to outside review in November 2001 and be delivered to the	ystem Monitoring) documents, the d iments: a November 2000 letter cor Interim Report providing detailed on volvement elements. g whether the Research and Monito the draft plan is available for review mittee will spend the summer and Trustee Council in January 2002.	Iraft Science F mmenting on t comments on f oring Plan is c . As currently early fall prepa	Program ar he schedul the draft sc omplete, s scheduled aring its fin	id the draft R le and proces ience progra cientifically s l, we will rece al report. Th	esearch ar ss by which m, includir ound, and ever the dra e report is	nd i the ig meets aft plan
02455	Gulf Ecosystem Monitoring and Research Program Data System	Restoration Office	ADFG	Cont'd 2nd yr.	\$150.0	\$150.0	
This projec developing expected F	ct will continue work on the data system for GEM. Funding was p this essential part of the GEM program; hiring is expected to occ FY 02 cost is \$150,000.]	rovided in FY 01 to hire a data syst cur in late spring 2001. [Note: Det	em manager t ailed Project [o provide t Description	he leadershij and budget i	o necessar not yet prov	y for vide d;
02475-BAA	GEM Data System Specification	S. Marley	NOAA	New		\$250.9	\$0.0
				1st yr., 1	yr. project		
This projec already per for Proposa	t will produce the Operations Concept and Systems Requiremen formed, and through a detailed requirements definition approach al (RFP) for the permanent system.	ts Specification for the data system a, we will be able to develop the deta	for GEM. Th ailed description	is project v on necessa	vill capitalize ary to release	on the wor a formal F	k Request

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INDEX OF PROPOSALS BY REDURCE CLUSTER -- FY 02

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02536	Synthesis of Spill Damaged Resource Information into the Heritage Data Management System	e T. Gotthardt, K. Boggs/UAA	ADFG	New 1st yr., 1	yr. project	\$118.2	\$0.0
This project (HDMS). terrestrial resources using HDM	ct will synthesize conservation information pertaining to specie HDMS is part of an effort by The Nature Conservancy and 86 and nearshore endangered species and ecosystems. It is the information into HDMS would ensure linkage of EVOS inform MS as an integral tool within GEM to track the recovery status	es and ecosystems damaged by the oil spi Natural Heritage Programs throughout the largest biodiversity conservation effort of nation to broader based conservation effort of injured resources.	II into the H Western I its kind. Th s. The pro	leritage Da Hemispher ne incorpor ject will als	ta Managem e to docume ation of spill o evaluate ti	ent Systen nt informat affected ne effective	n ion on mess of
02584	Evaluation of Airborne Remote Sensing Tools for GEM Monitoring	E. Brown/UAF, J. Churnside/NOA	A ADFG	New 1st yr., 3	yr. project	\$118.4	\$240.0
This proje package o AVHRR), infrared di The FY 04	ct will evaluate airborne remote sensing tools for GEM monito consists of (a) a pulsed lidar to map subsurface biological feat (c) two three-chip digital video systems to map ocean color (c igital video to map birds and mammals at night. The project w t cost (year 3 of the project) has not been provided.]	pring, including a biological/ecological inter ures day to a maximum of 50 m, (b) an inf chlorophyll), birds, mammals, surface fish s vill use shipboard and buoy data for valuda	pretation of rared radio schools, an tion and in	the data c meter to m d ocean fro terpretatior	ollected. Th ap SST day ontal structur of remote s	e instrume (similar to e, and (d) a ensed data	nt an a. [Note:
02597-BAA	Ocean Color Time Series of Prince William Sound	S. Pegau/ OSU	NOAA	New 1st vr 1	vr. project	\$28.5	\$0.0
This proje of the coa state of the extent of t seasonally	ct will develop a time series of chlorophyll concentrations and stal waters of Alaska and Prince William Sound in particular. e art algorithms. The data will be mapped into regional areas he time series will be examined. This data set will allow inves y, and annually during the life of these missions.	other ocean color products for general us SeaWiFS data collected at University of A at 1km resolution. The possibility of addir stigators to examine how the base of the fo	e. The time laska-Fairt ng CZCS a ood chain (p	e series wil banks will b nd OCTS o bhytoplankt	l include full e processed lata to increa on) has vari	resolution with the clase the terred monthly	images urrent ìporal ′,
02600	Synthesis of the Ecological Findings from the EVOS Dam Assessment and Restoration Programs, 1989-2001	age R. Spies/EVOS Chief Scientist, e al	t ADNR	New 1st yr., 2	yr. project	\$151.6	\$324.9
This proje anthropog manuscrip EVOS res	ct will synthesize the significant results from 12 years of post- penic and natural forcing factors influencing the northern Gulf of the that will either be submitted to a journal for publication as a toration program and help set the foundation for GEM.	spill study in the EVOS damage assessme of Alaska. The results of the synthesis will a whole volume, or to a publisher as a bool	ent and rest be incorpo <. This effo	toration pro prated into a prt will be o	grams as th a series of in ne of the ma	ey relate to terrelated jor product	is of the
02604	Gear Selectivity in Trawl Surveys along the Northern Gulf Alaska	of W. Bechtol/ADFG	ADFG	New 1st vr., 2	vr. project	\$52.1	\$15.0
This projections conditions One survections series, datection composition	ct will explore approaches to developing long-term monitoring and changes in the northern Gulf of Alaska. Time series dat by series dates to the 1970's and uses a small-mesh trawl that ting to 1990, uses a larger-mesh trawl fished closer to the bot on time series from these two survey types will allow determin	techniques for forage fish populations in (a are available for two different trawl surve t catches species representative of the und tom and catching substantially different sp ation of gear selectivity between these trav	Cook Inlet, ys conduct lerlying for ecies comp vls.	an area rep red in Kach age base in position. C	oresentative emak Bay in h this area. omparison o	of ecosyste lower Coo The second f the catch	∋m ₁k Inlet. J survey

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02609	Long-Term Temperature/Salinity Monitoring Within the Alask Coastal Current	a T. Weingartner/UAF	ADFG	New 1st yr., 2 y	y r. project	\$59.8	\$15.5
Interannual marine eco near Sewar interannual suggested	variations in temperature, salinity, and their vertical distribution system. This variability needs to be quantified and understood d. This project maintains this time series and will continue to quariations in near-surface (upper 10 m) stratification and the times being an important component to the development of the GE	on the northern Gulf of Alaska shelf based on extended time series such uantify the variability and understand ning of the spring bloom on the inner M program.	reflect enviror as the 30-yea the sources o shelf. The da	nmental cha r record at of it. It will a ata and ass	inges that m hydrographi ilso begin to ociated anal	hight affect c station G document yses are	this AK1
02614	Monitoring Program for Near-Surface Temperature, Salinity, and Fluorescence in the Northern Pacific Ocean	S. Okkonen/UAF	ADFG	New 1st yr., 2	yr. project	\$38.2	\$17.1
This project temperature	t will use a thermosalinograph and fluorometer, to be installed o e, salinity, and fluorescence fields along the tanker route betwee	on a crude oil tanker, to acquire conti en Valdez, Alaska and Long Beach,	nuous, long-te California.	rm measur	ements of th	ne near-sur	face
02618-BAA	Measurements of Tide Rip Front Variability in Cook Inlet	S. Saupe/CIRCAC	NOAA	New 1st vr., 2	vr. project	\$11.7	\$3.7
This projec	t will use a vessel-mounted thermosalinograph to acquire long-t d intensity of tide rip fronts in Cook Inlet.	term measurements of near-surface	temperature a	ind salinity	to identify va	ariability in t	the
02622	Digital Maps from Existing Seasonal Environmental Sensitive Area Maps: Cook Inlet/ Kenai Peninsula	J. Whitney/ NOAA	NOAA	New 1st yr., 1	yr. project	\$36.6	\$0.0
A series of Peninsula r Division in for digital p four-tiered Prince Willi	national standardized digital map products will be produced form made by NOAA in 1994. A four map seasonal series was origin the ArcInfo digital format with the output and distribution primari roducts, NOAA's digital ESI products have greatly expanded. T nationally standardized set of digital map products with the deliv am Sound under Project 99368.	m the existing seasonal environment ally developed for Cook Inlet by the I ly being poster maps at a scale of 1: his project will transform the existing rerable being 100 CD's. These will b	al sensitive ind NOAA Hazard 450,000. Sinc Cook Inlet/ K e the same pr	dex (ESI) m ous Materia te then, com enai Penins oducts that	aps for Coo als Respons abined with sula digital d were recen	ok Inlet/ Ke e and Asse greater der ata into a tly provideo	nai ≫ssment mand d for
02624-BAA	A CPR-Based Plankton Survey Using Ships of Opportunity to Monitor the Gulf of Alaska	 S. Batten/SAHFOS, D. Welch/DFOC 	NOAA	New 1st yr., 1	yr. project	\$133.4	\$0.0
This projec marine food atmosphere valuable ma monitoring Council's lo	t presents the rationale for developing a plankton monitoring production of the provided chain whose dynamics are poorly understood, but respond rapse and valuable upper trophic level populations, such as salmon, arine resources in the Gulf of Alaska are strongly influenced by and this project will build on recent experience gained with the Gong-term research program).	ogram for the Gulf of Alaska using sh bidly and unambiguously to climate c herring, shrimp, and groundfish. Th changes in ocean climate. Ships of CPR (continuous plankton recorders)	hips of opportu hange and for le proposal rev opportunity an) in the North F	nity. Plank m the link b views the ev e a cost eff Pacific to pr	ton are a cr etween cha vidence that ective platfo epare for G	itical link in nges in the many of th rm for large EM (the Tr	the e most e scale ustee

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INDEX OF PROPOSALS BY R URCE CLUSTER -- FY 02

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02627-BAA	A Symbiotic Acoustic Signal Processor to Increase Ste Assessment Effort	ock J. Dawson/BioSonics, Inc.	NOAA	New 1st yr., 1	y r. proje ct	\$171.0	\$0.0
This project shipboard e geo-referen abundance does not red	will develop a Symbiotic Acoustic Signal Processor (SA cho sounder and routes the output over an Ethernet cor ced raw digital acoustic data in an established scientific and distribution of stocks within the sampled areas. The quire dry-dock installation or towing of an underwater tra	SP) system, consisting of a high resolution digitan nection to displays, storage, and processing system format to PC hard disk. The data collected and e design philosophy provides a low-cost system ansducer sled, and does not effect the operation	al sonar re stems. Th analyzed that is ext of the cur	eceiver than is system using this remely sim rently insta	t attaches to provides the system can aple for a ski alled echo so	an existing capability determine oper to ope under.	g to store erate,
02628-BAA	Resurrection Bay Contaminant Survey	P. Homan/ Qutekcak Native Tribe	NOAA	New	vr. project	\$128.8	\$9.1
Qutekcak N fisheries, wa collect twen Persistent C	ative Tribe would like to lead the way in protecting Resu astewater treatment discharge, leaky septic systems, bo ty ocean floor sediment samples from Resurrection Bay Organic Pollutants. The results of the analyses will be p	arrection Bay from pollution and misuse. Immedi bat harbor, coal terminal, and large ships such as and analyze them for contaminants including m ublicized via public meetings, reports, and a web	ate sourc barges, t etals, coli site.	es of pollu ferries, and form bacte	tion in the ba d cruise ships ria, pesticide	y include i s. This pro es, and oth	ndustry, bject will er
02629-BAA	Development of a Paradigm for Ecosystem Monitoring	g R. Thorne/PWSSC	NOAA	New		\$95.0	\$0.0
This project recommenc methods ide individual-or Ecosystem	will evaluate the GEM draft plan and draft recommendate led a list of modifications to GEM. However, we believe entified by GLOBEC planners in the early 1990's, such a rganism approach and more. Our experience with programs Assessment addressed these issues with some succes	ations to GEM that would improve research efficient that they missed some potentially serious issues as the limitations of measurement, correlation-ba rams of the Prince William Sound Science Centers s.	ency and regarding sed analy er, Oil Spil	focus. The g the limita /ses, uncou ll Recovery	e National R ations to exis upled predict / Institute an	esearch Co ling scienc ion-oberva d Sound	ouncil e ition, the
02630	Planning for Long-Term Monitoring and Research Pro	ogram Restoration Office	ALL	Cont'd	\$100.0	\$100.0	}
In March 19 area and ad and will con FY 01, follow Plan is unde [Note: Deta	99, the Trustee Council earmarked an estimated \$120 r jacent northern Gulf of Alaska. Development of what is tinue through FY 02. In FY 00, a draft GEM Science Pro w-up on the National Research Council's recommendati erway in FY 01 and will be completed in FY 02. This pro iled Project Description and budget not yet provided; ex	million of Restoration Reserve funds for a long-te now called the Gulf Ecosystem Monitoring and ogram (April 2000) was developed and submitter ons on the GEM Science Program is occurring. oject is accomplished through the combined effor spected FY 02 cost is \$100,000.]	erm monit Research d to the N Developr ts of the I	oring and ((GEM) pro ational Re nent of a d Restoratior	esearch pro ogram was ir search Coun raft Monitori o Office and	gram in the nitiated in F cil for revie ng and Res Chief Sciel	e spill FY 99 ew. In search ntist.
02633	Acquisition of Chemical, Physical, and Biological Infor Kodiak Regional Water Quality	mation on R. Ward/Kodiak Area Native Association	ADEC	New 1st yr.	.£ ₩	\$446.6	
This project other import relevant to f	will (a) develop nearshore monitoring stations to gather tant marine organisms, (b) develop monitoring stations f isheries and oceanographic investigations, and (c) deve	r information on species composition and rates of for remote telemetry of temperature, salinity, curr elop methods for utilization of satellite imagery te	f settleme rents, zoo chnology	ent of shell plankton d through co	fish, barnacio ensities, and ordination w	es, algae, a l other data ith NASA.	and a

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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02 636- BAA	Ecosystem Recovery Through a Partnership with the Spill-Impacted Communities	K. Adams, B. Perrine, R. Mullins/Cordova	NOAA	New 1st yr., 1 y	/r. project	* *	
The goal of successes of realizing the risksto be common goa	securing and sustaining the recovery of the marine system is a firs of the Council's Restoration Plan, that goal is within reach. The ecc goal. In this regard, commercial fishing has the involvement, reso one of the most effective partners. This project well develop a pla al than is possible through the same investments expended indepe	t priority for the Trustee Council as w pnomies and the communities of the purces, and motivationthrough long in and demonstrate that a partnershi endently. [Note: Budget not provided	rell as for t spill-impa- term fina can acco .]	he spill-imp cted region ncial positio omplish sigr	acted regio are the natu ns and com nificantly mo	n. Given th ural partner umitted fina ore toward o	ne rs for ncial our
02637	Online Early Life History Database for the Northeast Pacific Ocean, Gulf of Alaska and Southeast Bering Sea	J. Duffy-Anderson/NOAA	NOAA	New 1st yr., 2 y	yr. project	\$143.7	\$1.2
This project and southea searchable, managers a	will develop a public, online, early life history database for more that ast Bering Sea. The database will merge sample collection information internet-based database. This database will provide global access and other users access to accurate, relevant information on ichthyo	an 20 years of ichthyoplankton data a ation with a larval identification guide s to these resources, providing a plat plankton distributions in Alaska.	rom the n and ichthy form for th	ortheast Pa /oplankton one generation	cific Ocean distributiona on of hypoth	, Gulf of Ala I atlas into eses and c	aska, a offering
02640	High Frequency Surface Wave Radar Test in Prince William Sound	A. Kotlarov/Alaska Marine Technology Corp.	NOAA	New 1st yr., 2 y	yr. project	\$129.5	\$128.4
This project technology v sound's circ provide real- upwelling dy	will analyze surface currents in Prince William Sound with a portal will increase knowledge and understanding of the overall distributio ulation obtained from models such as those developed by Wang, I -time and archived data about ocean surface currents in the sound mamics. The complete system will consist of two radars that are c	ble short-range, high-frequency surfa on of currents in the sound, and will a Deleersnijder, Mooser and others. O I. Observations will include current s apable of measuring current vectors	ce wave r dd signific nce deplo peed, curr in real tim	adar system antly to exis yed and ope rent directio le out to a d	n. Use of th sting informa erating, this n, diversion listance of fi	is advance ation about system wil flow and fty miles.	ed the I
02643	Design of the Environmental Specimen Bank Program for GEM	P. Becker/NIST	DOI	New 1st vr., 1 v	vr. proiect	\$85.4	\$0.0
This project contaminant banking prof associated v Native comr	will develop a design and implementation plan for an Environment ts monitoring and research. This plan will provide organizational fra- tocols, recommendations on specimen sizes and frequency of colle- with GEM, recommendations on specimen access policy, identification nunities), and cost estimates for instituting and maintaining an Environment	al Specimen Bank component to GE amework, facility requirements, ident ections, establishment of database n ation and development of collection p ironmental Specimen Bank system f	M specific ification o etwork wit latforms (or GEM.	ally designe f specimens h other kinc including pa	ed for enviro s of interest, ls of archiva artnership w	onmental collection al facilities ith local Ala	and aska
02648-BAA	Cost Effective Data Acquisition Using Adaptive Sampling and Combining Information Strategies	D. Dorsett/Baylor Univ.	NOÁA	New 1st yr., 2 y	yr. project	\$56.2	\$58.1
This project used in GEN of combining	will analyze data acquired in a pilot study of adaptive sampling by A. Detailed adaptive sampling methods will be documented to enh g data from different sources will be determined and documented f	FOCI in 1999 to provide information ance cost effective methods of data for further efficient data utilization.	for design collection.	ing adaptive In a secor	e sampling r nd phase, st	nethods to atistical me	be ethods

Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02655-BAA	Transition Support for the GEM Data Manager	C. Falkenberg/ECOlogic Corp.	NOAA	New 1st yr., 1	yr. project	\$120.3	\$0.0
This project a GEM data Project 004	t will support the GEM data manager during FY 02 in order to a system, the rescue of legacy EVOS data, and the integratior 55, we anticipate that the data manager will set the final priori	ease the transition to the GEM data systen of the administrative databases. Although ities and select one or more of the tasks p	m. Tasks gh these a roposed.	will addres e the prior	ss the challer ities that hav	nge of form e emerged	ulating I from
02667	Effectiveness of Citizens' Environmental Monitoring Program	m S. Mauger/Cook Inlet Keeper	ADEC	New 1st yr., 1	yr. project	\$16.7	\$0.0
This project commuinity selection ar (Kenai Wat future comr	t will analyze five years of past data from Cook Inlet Keeper's -based water quality monitoring program in Alaska. Keeper's re effective at meeting the monitoring objectives of detecting s ershed Forum, Anchorage Waterways Council, Wasilla Soil a munity-based monitoring programs.	Citizens' Environmental Monitoring Progra Stream Ecologist will determine if sampli significant changes in water quality over tir and Water Conservation District) refine the	am, the firs ng frequen ne. The re ir commur	et consister cy, methoc esults will a hity monitor	nt, credible, a ds, paramete assist Cook li ring efforts a	and coordir rs, and site nlet Partne nd may lea	nated ≩ rs ad to
02668	Developing an Interactive Water Quality and Habitat Databa and Making it Accessible on the Web	ase J. Cooper/Cook Inlet Keeper	ADEC	New 1 1st yr., 1	yr. project	\$15.0) \$0.0
The project equally sha stakeholder GIS waters threats to, a	partners have come together to form a database committee re, report, and review their water quality and habitat data. The rs, resource managers, and the public. The committee will up hed maps, photos, and graphs so that it is user-friendly, educ and solutions for, water quality and habitat.	to create a consistent data management are committee's objective is to make data molink a shared interactive database on the ational and meaningful. Access to this database	system wh hore acces Internet w hta will help	ere all citiz sible and n here it can facilitate a	ens groups a nore useful t be viewed a a better unde	and agenci o decision nd queried erstanding	es can makers, with about
02671-BAA	Coordinating Volunteer Vessels of Opportunity to Collect Oceanographic Data in Kachemak Bay and Lower Cook In	D. Stram, C. Schoch/Kachemak let Bay Research Reserve	NOAA	New 1st yr., 1	yr. project	. \$53.1	\$0.0
Cook Inlet I community Drift cards v These data mixing patte	Keeper and the Kachemak Bay Research Reserve will coordin involvement. Instruments installed on charter boats will be us will be deployed seasonally at locations surrounding the region will also be correlated with existing stationary sensors and vo erns and their relationships to the dispersal of larvae and pollu	nate the collection of oceanographic data sed to collect time-series of temperature a n. Collected data will be used to infer reg plunteer-monitoring projects to expand spa utants in the region.	from ships and salinity ional water atial and te	of opportu from trans circulation mporal kno	inity and with sects along k a and mixing owledge of w	n extensive Cachemak characteri vater qualit	local Bay. stics. y and
02678-BAA	Identifying Community-Based Ways to Use Commercial Fisheries Bycatch for Scientific Gain	W. Wilson/ LGL Alaska Research Associates	NOAA	New 1st yr., 1	ير yr. project	\$128.1	\$0.0
This project of Alaska. samples us design at ap identification evaluate the	t will investigate the feasibility of using commercial fisheries by Initial efforts will include a comprehensive overview of comme eable for scientific purposes. Pilot research will be conducted opropriate spatial scales. Sampling protocols will then be con n, preservation, and vouchering of specimens. Methods for d e sampling protocol and specify a future full-scale study desig	ycatch to increase scientific knowledge of ercial fisheries, vessel types, seasons, and d with selected members of the fishing co inducted to field-test the design. Additional lata analysis and reporting of geospatial d in.	rare and i d locations mmunity to methods ata will als	nfrequently most likely develop a and proced o be descri	v-studied icth v to yield reginstatistically- statistically- lures will be ibed. A final	yofauna in ional bycat valid expe described report will	the Gulf ch rimental for the

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Proj.No.	Project Title		Proposer	Lead Agency	New or Cont'd	FY02 Expected	FY02 Request	FY 03 Request
02680	Remote Delivery of Persistent Org Fishes	anic Contaminants in Alaska	S. Rice, J. Short, A. Moles/NOAA	NOAA	New 1st yr., 1	yr. project	\$75.6	\$0.0
This proje geographi known im salmon re Alaska.	ect will determine the distribution of per ic areas of Alaska. A suite of contamir plications for aquatic and human healt eturning after 3-5 years. This will give s	sistent organic contaminants in nants, including pesticides, Pol h, will be measured in two age some measure of the extent of	n the flesh and ovaries of different ye ychlorinated biphenyls (PCBs), and o classes of salmon. These will be sa atmospheric distribution of industrial	ar classes chlorinated lmon retur and agric	of chinoo I and unch ning after ulture polli	k salmon froi lorinated hyd only a year ir utants over a	n four maj rocarbons, n saltwater range of ri	or , with and ivers in
Public Infor	mation/Science Mgt./Admin.					\$1 ,8 46.8	\$2,037.4	\$0.0
02100	Public Information, Science Manag	gement, and Administration	All Trustee Council Agencies	ALL	Cont'd	\$1,500.0	\$1,500.0	1
Trustee C of the 17- FY 02 wo \$1,500,00	ouncil staff working at the direction of member Public Advisory Group (PAG) rk plan of research, monitoring, and ge 00.]	the Executive Director, the sci , and Trustee agency participa eneral restoration projects. De	entific peer review process, public inv tion in the restoration program. [Not tailed Project Description and budge	volvement e: This pr t not yet pr	efforts inc oject will b rovided; ex	luding the ac le funded out pected FY 0	tive partici side of the 2 cost is	pation regular
02350	Alaska SeaLife Center Bench Fee	S		ADFG	Cont'd	\$300.0	\$300.0	
This proje Council th Vertebrate \$300,000	ect will pay for the use of labs and offic nat have a SeaLife Center component. e Predators and 02558/New Technolog is based on FY 01 bench fees for thes	e space, as well as other direc Two FY 02 proposals include gies for Monitoring Harbor Sea se two projects.]	t expenses, at the Alaska SeaLife Ce a SéaLife Center component: Proje I Health. [Note: Detailed Project De	enter for th ct 02423/F scription a	iose projec Population Ind budgel	cts funded by Change in S not yet provi	the Truste elected Ne ded; estim	e arshore ate of
02535	EVOS Trustee Council Restoration	n Program Final Report	EVOS Restoration Office	ADFG	Cont'd 2nd yr., 1	\$46.8 2 yr. project	\$50.1	\$0.0
This proje Plan and This proje similar tru lessons le	ect will provide a final report for the acti disbursements of the final payment fro ect will increase public awareness and istee situation) with a detailed history c earned in the groundbreaking EVOS ef	ivities of the Trustee Council, s om Exxon. It will also include a understanding of EVOS restor of the <i>Exxon Valdez</i> Oil Spill Re fort. This published history wil	tarting with the earliest damage asse complete history of the litigation lead ation activities, policies, and procedu estoration process, including highlight linclude references and an index.	ssment e ling to the res. It will is and pitf	fforts and civil settle provide a alls, so tha	ending with the ment, which gencies and to thers can address to the second state of th	he FY 02 V funds the (groups (fac benefit fror	√ork Council. cing a m
02550	Alaska Resources Library and Info	ormation Services (ARLIS)	All Trustee Council Agencies	ADFG	Cont'd	AL LOUIDO	\$140.3	,,
This proje informatio cleanup; c	ect is the Trustee Council's contribution on generated through the restoration pr damage assessment, and restoration e	n to the Alaska Resources Libra rocess. In addition, ARLIS acts efforts following the spill.	ary and Information Services (ARLIS s as the public repository for reports a). ARLIS and other	serves as materials	a central acc generated as	ess point fo a result of	or `the
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;				Lead N	ew or FY02	FY02	FY 03
Proj.No. Project Title		Proposer		Agency C	ont'd Expected	d Request R	equest
2570 Book on EVOS Science for General Readers		S. Loshbaugh/Freela	ance Writing	ADFG. Ne	ew st yr., 1 yr. project	. _{62:} \$47.0	, \$0
This project will produce a publication-ready, book-length ma reader, it will emphasize the cutting-edge quality, adventurou symposium presentations and review of the technical literatur indigenous knowledge systems, legal entanglements, technic hold for future research design, science in the public arena, a	anuscript about t is experiences, ire, it will include cal advances, th and the environr	he scientific and restoral ethical issues and lucid, discussion of scientists' e interdisciplinary ecosys nent.	tion projects f non-technical personal mot stem approac	bllowing the oi explanations ivations, partn h, and the imp	I spill. Written for of findings. Based erships between v lications both proc	the intelligent la l on interviews, Western: and cess and findin	ay gs
roject Management		<u>,</u>	<u> </u>		÷ \$200.0	\$200.0	
2250 Project Management		All Trustee Council A	Agencies	ALL C	ont'd \$200.0	\$200.0	
managed consistent with the Memorandum of Agreement an managers include coordinating activities between principal in development of project proposals, and tracking project report	nd Consent Deci ivestigators and rts. [Note: Detai	ree, the Restoration Plan the Restoration Office, r led Project Description a	, and Trustee eviewing proj nd budget no	Council author act expenditur yet provided;	prization. Taşkş p e activity, asşiştin expected FY 02 c	erformed by pr g in the cost is \$200,000	oject 0.]
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Proj.No.	Project Title	Proposer	Lead Agency	New or Cont'd	r FY02 Expected	FY02 Request	FY 03 Request				
				·	All Proposals*	Work Pla	an Only**				
		Total Continuing Projects FY 02	Expected:		\$4,704.1	\$3	,204.1				
		Total Continuing Projects FY 02	Requested:		\$5,104.7	\$3	,604.7				
		Total New Projects FY 02 Reque	sted:		\$6,791.0	\$6	,791.0				
		Total New & Continuing Projects	FY 02 Reque	sted:	\$11,895.7	\$1C	,395.7				
		* 109 projects were received (41 for the following projects are estin prepared: 02154/Archaeological 02250/Project Management (\$20 02455/GEM Data Management (02100/Public Information/Science estimate has yet been developed budget was submitted for 02636/ Communities.	continuing an mates, as buo Repository P 0.0), 02350/A \$150.0), 0263 Managemer I for 02126/Ha /Recovery Thr	d 68 new Igets hav roject Ma SLC Ber O/GEM F ot/Admini abitat Pro rough Pa	68 new). The costs included ets have not yet been ject Management (\$29.1), LC Bench Fees (\$300.0), /GEM Planning (\$100.0), /Administration (\$1,500.0). No itat Protection Support and no ugh Partnership with						
		** The Work Plan Only column in Information/Science Managemen Protection Support will also be fu estimate is not yet included for th	cludes all pro nt/Administrati nded outside nat project.	jects exc on (\$1,50 of the wo	ept 02100/Pub 00.0). 02126/Ha ork plan, but a c	lic abitat cost					
		NOTE: The FY 02 funding cap s is expected for 02100/Administra	et by the Cou ation and the L	ncil is \$6 balance f	5.5 million (\$1.5 for work plan pr	i million ojects).					
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PHOTOGRAPHIC AND ACOUSTIC MONITORING OF KILLER WHALES IN PRINCE WILLIAM SOUND AND KENAI FJORDS, ALASKA (Submitted under BAA #52ABNF100031)

Project Number: 00212 020 12-BAA

Restoration Category: Monitoring, Research

Proposer: North Gulf Oceanic Society

Lead Trustee Agency: NOAA

Duration: 1 year

Cost : \$69,883

FY 2002

Geographic Area: Prince William Sound/Kenai Fjords, Alaska

Injured Resource/Service: Killer Whales

ABSTRACT

This project continues the monitoring of the damaged AB resident pod and the potentially endangered AT1 transient population as well other Prince William Sound/Kenai Fjords killer whales. Monitoring has occurred on a yearly basis since 1984. Methods include the photoidentification of individual whales and acoustic monitoring with remote and vessel -based hydrophone systems. The project continues interpretation of current and previous data as well as collection of data additional to this project using other resources .

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INTRODUCTION

This project is a continuation of the reduced annual killer whale monitoring program. Killer whales were monitored under EVOS Trustee Council funding in 1989, 1990, and 1991 (damage assessment) and in 1993 and 1995 (restoration monitoring). A reduced annual monitoring program was initiated in 1996. Analysis in this project will build on results of the comprehensive killer whale investigation initiated in FY95 and continued in FY96, FY97, and FY98. In FY99 and FY00 the monitoring program was augmented with matching funding to continue aspects of genetic and contaminant analysis and we expect this to be the case in 2002.

On March 31, 1989 AB pod was observed in oil sheens and six of the 36 pod members were missing. A total of 14 whales were lost from resident AB pod in the two years following the *Exxon Valdez* oil spill and there was no recruitment into the pod during those years. Since that time the social structure within AB pod has shown signs of deterioration. Maternal groups have traveled independently or with other pods, and pod members have not consistently traveled with closest relatives. Although 4 calves were recruited during the period 1992-1994, there were 5 additional mortalities in 1994. There has been a net increase of three individuals since 1995. In 2000 there was one recruited calf and no new mortalities, the pod currently contains 25 individuals. The rate of mortality observed in this pod after the oil spill far exceeds that recorded for other resident pods observed in Prince William Sound over the past 13 years or for 19 pods in British Columbia over the past 20 years. A reduced mortality rate is essential for the recovery of this pod.

Nine whales from the transient AT1 group have not been observed since 1989. Two additional AT1 whales have not been sighted for seven years. Another member of this group stranded and died on a beach near Cordova, Alaska in July 2000. From genetic and photographic data from beached whales, three of these twelve missing AT1 group whales are known to be dead. Although transient killer whale social structure is not fully understood, we are confident that the other missing AT1 whales also are dead. Statistical analysis backs up this supposition and strongly suggests that they have either died or permanently emigrated from the area. Since there is no record of these whales in adjacent regions and they appear to have a limited range, it is most likely that the missing AT1 whales are dead.

This project will continue the monitoring program necessary to map the changes (recovery or non-recovery) of Prince William Sound killer whales on a reduced annual basis. Behavioral observations and spatial and temporal data will be collected opportunistically in the course of photographic and acoustic monitoring, but there will be no new analysis of this data. We will continue with population modeling begun in 2000.

Fourteen years of systematic data collected under public and private funding have been placed in a specially designed GIS database currently housed at the U.S. Fish and Wildlife Service, Marine Mammals Management Division, Anchorage, Alaska and at Alaska Pacific University, Anchorage, Alaska under the management of collaborator, Dr. David Scheel The database contains 763 records of encounters with killer whales in and near Prince William Sound and Kenai Fjords, Alaska. Among these are 557 encounters with resident whales and 206 encounters with transient-type whales. Analyses have determined large-scale differences in spatial distribution patterns between resident and transient whales over time (Sheel et al. 2001). Changes in transient whale distributions have been examined in relation to changes harbor seal populations.

There is worldwide concern that specific PCB and dioxin congeners may have negative effects on reproduction in mammals. The recovery of killer whales in Prince William Sound and the long-term health of the population is dependent on unimpeded reproductive processes. Recently there is concern over contaminant levels and their relationship to the recent decline of southern resident killer whales in Puget Sound. During this study we have measured contaminant levels in both resident and transient killer whales, and found much higher levels in the transient population. Contaminants apparently passed from mother to offspring via lactation and levels follow consistent patterns within genealogies (Ylitalo et al in press). Samples were obtained from individually identified living whales that can be re-identified and re-sampled to assess future changes in levels. The ability to sample and potentially resample specific known individuals and their known kin is a unique aspect of this project. Results of contaminant analysis (Ylitalo et al in press) raise concern that contaminants in transient whales could negatively impact reproduction and or reduce immune response leading to mortalities. There has been no successful reproduction in the AT1 group since 1984. All chemical analysis of tissue and assistance in the interpretation of results has been provided by the NMFS/NOAA Environmental Contaminant Laboratory, Seattle, Washington under a cooperative agreement with N.G.O.S.

In FY97 we initiated a remote hydrophone and acoustic monitoring as a long-term assessment tool. Initial analysis and separation of pods has been completed and an initial publication has been submitted. (Yurk et al. in review). Currently we are operating a single hydrophone in Resurrection Bay powered by solar and wind power and using microwave transmission technology. It is currently operational and is effectively documenting presence and absence of killer whales during the winter months.

We are still compiling our catalogue of acoustic dialects for resident pods. In 1999 we obtained needed recordings of AJ, AD05 and AD16 pods. We are hopeful of obtaining additional recordings of AG, and AF pods to fill out pod specific repertoire data. (NGOS is using a 16 year database of killer whale recordings to establish killer whale dialects). The dialect of the AT1 transient group have been established and also related to behavior. (Saulitis et al in review) The dialect catalogue is used to document the presence of specific killer whale pods and groups recorded from the remote hydrophone. The long-term goal of this aspect of the project is to determine the extent of winter use by killer whales of these inshore waters and provide an additional, innovative, cost effective tool for monitoring killer whales year round. A hydrophone in Resurrection Bay has the added benefit of providing a continuous live feed to the Alaska Sea Life Center and throughout Seward via FM link for the education of visitors and residents. In winter 2000-2001 acoustic monitoring indicated whales were present on an intermittent basis in late fall/early winter and also in late winter in Resurrection Bay. Analysis of pods present is in process; it appears AB pod and AJ pod were present on a routine basis.

NEED FOR THE PROJECT

A. Statement of Problem

The AB pod of killer whales was injured by the EVOS. Although it had shown signs of recovery from 1991 to 1993, mortalities in 1994/95 reduced the number of surviving AB pod whales to 22. Since 1995 there has been a net gain of three individuals, however, it will not be clear whether recovery will be dependent on reduced mortality rate (Matkin et al 2000). At least 12 of the original 22 members of AT1 group of transient killer whales have apparently died since 1989 and there has been no recruitment within the group. Recovery for this group seems doubtful at this time and a petition to list them as an endangered population is in preparation. This project will continue to monitor the status of AB pod and the AT1 group.

Sightability of killer whales in Prince William Sound has changed since the spill; particularly resident whales have been more frequently encountered in the Kenai Fjords region. Transient whales are seen less frequently in all areas than prior to the spill.

Initial mortalities within AB pod following the spill have apparently led to additional mortalities due to loss of key individuals. Deterioration of AB pod social structure has led to a situation where one subpod now travels separately most of the time (the AB25 subpod travels with AJ pod). The project will provide long-term insight into effects of changes in killer whale social structure due to unnatural mortalities. A detailed population model for resident killer whales is under construction.

Despite considerable effort, re-sightings of the AT1 group have declined and fewer individuals are seen when members of this transient group are located. We are confident that 12 of the original 22 members of this group are dead, or have emigrated to other regions; although the later possibility is very unlikely. None of the AT1 whales have been sighted or identified in southeastern Alaska despite healthy pinniped populations and frequent transient sightings in that region.

Although the rate of encounter with members of the AT1 transient group has declined, there has been no detectable increase in the sightings of other transient groups, suggesting that other transients are not increasing their use of the Sound as use of the region as AT1 group declines. Whether this overall decline in the encounters with transient (marine mammal eating) killer whales is related to oil spill effects or ecosystem changes is not clear, but we suspect a combination of the two factors. It is likely that the severe decline in harbor seals and Steller sea lions are important factors in the decline of transients in the region.

MtDNA and nuclear DNA analysis has demonstrated the genetic uniqueness of the AT1 group from residents as well as from other transients. If the AT1 population does not have other components in western Alaska, the loss of the AT1 group could represent a serious overall loss of genetic diversity.

Some environmental contaminants such as PCBs and DDTs have been linked to reproductive dysfunction in mammals and immune system dysfunction. We have discovered very high levels of these contaminants in the transient (marine mammal eating) killer whales, including the non-reproducing AT1 group. When compared to other cetacean populations, these levels appear to be in a range that could result in reproductive dysfunction and reduced immune response or other effects that might impede recovery of this group.

B. Rationale/Link to Restoration

Annual killer whale population monitoring will determine recovery status of AB pod and the AT1 transient group. The status of AB pod is considered non-recovering at this time, the group numbered 25 whales and one subpod (AB25) traveled with primarily with AJ pod. It numbered 36 whales before the spill and was a unified pod. The recent slow growth in the pod suggests a recovery may finally be under way, however, this will only be clarified by continued monitoring. A low level annual monitoring program was initiated in FY96 and is proposed to continue in FY02. Since all pods and whales are not observed in every year, annual monitoring will prevent extensive data gaps and allow determination of recruitment and mortalities in a much shorter time frame. It is apparent that additional data is also required to create an adequate population model.

An annual killer whale behavioral database of spanning 17 years now exists in a GIS format. It is accompanied by a photographic database that includes identifications of all individuals from each frame of film for every encounter logged in the GIS system. This will facilitate development of potential critical habitats for killer whales, particular in the Kenai Fjords region where data of this type has been collected in recent years Because killer whales are a long-lived species with low reproductive and mortality rates, this monitoring must be consistent and long-term to be meaningful. Without the pre-spill monitoring of these whales damage assessment would have been impossible. This species is a key ecosystem element (a sentinel species) reflecting long-term environmental trends and is worthy of inclusion in a long-term monitoring program.

Continued development of acoustic monitoring and a dialect directory is providing a cost-effective year- round extension of the monitoring program. We will continue to work cooperatively with the Alaska Sea Life Center, Kenai Fjords National Park, and See More Wildlife Systems in this endeavor. In addition we will be providing (with supplemental NMFS funding) an annual workshop in May 2000 for tour and charter boat operators in the Kenai Fjords region. Over 100,000 visitors used these operators to view wildlife in 2000. Our program will directly involve residents and visitors in the process of monitoring and restoration through connection with Alaska Sea Life Center and Kenai Fjords tour and charter boat industry.

C. Location

This project is part of an ongoing killer whale research in Prince William Sound and the Kenai Fjords region, Alaska. The project involves the village of Chenega, Port San Juan Hatchery, the Alaska Sea Life Center, Kenai Fjords National Park, and other residents and visitors to the region. It operates cooperatively with the Kenai Fjords and Prince William Sound tourboat industry.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

There is great public concern and interest for killer whales in Prince William Sound and in Kenai Fjords. The rapidly expanding tourboat industry depends on a healthy killer whale population to attract and satisfy visitors and residents. We have been closely involved with tourboat and recreational operators and residents by exchanging sighting information on a daily basis and providing a catalogue of individual whales to enhance enjoyment of whale observation. We have provided and continue to provide workshops detailing whale biology. We will conduct our annual workshop with tourboat operators and conduct onboard training for operations around marine mammals. We are involved in the Youth Area Watch program, taking young students out to participate in our research. Recent publication of an updated identification catalogue that includes details of our research results and viewing guidelines has further sparked interest in these whales. Killer whales now draw thousands of visitors to the region each year.

We continue to collect observations and stories from native residents and others that will provide background for interpretation of our findings and place the work in a historical and cultural perspective. Some of these legends and stories are used to place our research in a broader context in our recent publication: "Killer Whales of Southern Alaska" (Matkin et al 1999).

PROJECT DESIGN

A. Objectives

1. Continue photographic monitoring program and determine status of resident killer whale pods, particularly AB pod. Examine the demographics of this pod in relation to other resident killer whale pods.

2. Monitor the AT1 group of transient killer whales to determine mortality or recruitment and indications of recovery to pre-spill distribution and abundance.

3. Monitor year round movements of resident and transient killer whales in Kenai Fjords using remote hydrophone in Resurrection Bay in the winter months.

4. Continued analysis of calls and separation of pod dialects necessary for interpretation of remote hydrophone data.

5. Continued development and publication of population model for resident killer whales

6. Examination of critical habitat for resident killer whales in the Kenai Fjords using GIS database and behavioral data.

7. Examine status of transient killer whales in the region and changes in encounter rates of these whales

B. Methods

Killer Whale Photographic Monitoring

The goal of this aspect of the study is the photoidentification of each individual in each pod/group, that regularly uses the Sound, particularly AB pod and the AT1 group. Knowledge of the demographics of all regularly sighted pods and groups may be necessary to meet recovery definitions.

Thus, it is important that researchers maximize the time actually spent with killer whales (particularly AB pod and the AT1 group) to insure thorough identification of all individuals. Methods proposed to obtain photographic data necessary to meet monitoring objectives will be similar to those used by the NGOS in Prince William Sound/Kenai Fjords for the past seventeen consecutive years. Searches for whales will not be made on random transects, but based on current and historical sighting information. In addition whales will be located by listening for killer whale calls with a directional hydrophone (calls can be heard up to 10 miles away), or by responding to VHF radio calls from other vessels reporting sightings of whales. We have developed network of cooperating vessel owners and tour boat operators that regularly report whale sightings. In addition, requests for recent killer whale sightings will be made routinely on hailing Channel 16 VHF and working channel 77.

A vessel log and chart of the vessel track will kept for each day the research vessels operate. Nobletech software and a laptop computer configured with GPS will automatically record the research vessel track in real time. The elapsed time and distance traveled will be recorded and vessel track plotted. Record will be made of the time and location of all whale sightings and the weather and sea state noted at regular intervals.

The Nobletech system will also be used to record specifics of each encounter with killer whales including the trackline during these encounters. This data system will be used in 2002 to log all encounters and summarize effort. Additional attention will be made to relate behavior to location using a Nobletech data recording system which relates precise geographic location to behavioral events. The new data collection system will be based killer whale encounter data sheets developed in 1995 and specifically tailored to GIS data entry. Data recorded will include date, time, duration, and location of the encounter. Rolls of film exposed and the estimated number of whales photographed will also be recorded. A chart of the whales' trackline during the encounter will be completed and the distance traveled by the vessel with the whales will be calculated by the Nobletech system on a daily basis. The new system will make it much simpler to to link general behavior of the whales (i.e. feeding, resting, traveling, socializing, milling) to location and time.

Photographs for individual identification will be taken of the port side of each whale showing details of the dorsal fin and gray saddle patch. Photographs will be taken at no less than 1/1000 sec using Fuji Neopan 1600, a high speed black and white film,. A Nikon 8008 or Nikon N70 autofocus camera with internal motor drive and a 300 mm f4.5 autofocus lens will be used. When whales are encountered, researchers will systematically move from one subgroup (or individual) to the next keeping track of the whales photographed. If possible, individual whales will be photographed several times during each encounter to insure an adequate identification photograph. Whales will be

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followed until all whales are photographed or until weather and/or darkness makes photography impractical.

All photographic negatives will be examined under a Wild M5 stereomicroscope at 9.6 power. Identifiable individuals in each frame will be recorded. When identifications are not certain, they will not be included in the analysis. Unusual wounds or other injuries will be noted. Photographic negatives will be analyzed using a photographic database that spans sixteen years. Identities of each whale that appears in every frame of usable film will be recorded and stored in VAX computer system. Final analysis and assessment will follow Matkin et al. (1994).

The primary vessel used to secure identification photographs will be a 34' diesel inboard powered vessel capable of 20 knots, that can sleep 3-4 individuals (R.V. *Natoa*). With sleeping accommodations and large fuel capacity, the R.V. *Natoa* can remain in the field for extended periods photographing whales. This vessel will operate a total of 50 days under funding from this project, with periods of operation in May as well as during the late July through early September period. From historical data these dates are judged to be to be the most likely time to encounter AB pod as well as many of the other resident pods that use the Prince William Sound and Kenai Fjords.

The report for the monitoring segment will include a summary of field effort, and summary of the pods and individuals encountered and a status report on AB pod and the AT1 group. Changes within AB pod will be examined with consideration for the age and sex structure of the pod and maternal groups within the pod and related to the population model now under development. Trends in transient killer whale sighting rates and demographics will also be presented. Frame by frame input of identification data from exposed film into VAX and IBM PC computer systems will occur and identifications tabulated by pod and by individual. Copies of killer whale encounter data and vessel logs will be made available to the EVOS Trustee Council and/or lead agency and this data will be archived in the GIS database for potential future analysis. Frame by frame identification data will also be made available on disk. Copies of the GIS program and data base will be available by request to NGOS.

Acoustic Monitoring

Pod specific dialects for resident killer whales have been determined from recordings made by several researchers in the Prince William Sound area and in Southeast Alaska during the spring and summer months of the years 1984 to 2000. Construction of a catalogue of pod specific dialects for all pods, including those infrequently encountered is an ongoing process and dependent on recordings that will be made during the FY02 field season. Specific calls from Prince William Sound transient (AT1 group) killer whales also have been catalogued (Saulitis 1993, Saulitis in review.). A total of 8456 calls have been screened and digitized using a Kay Elemetrics Real Time Sound Spectrum Analyzer, Model 5500. Samples from this screening process were digitized using the Canary acoustic spectrum analysis software (The Cornell Bioacoustics Workstation). Calls from different killer whale pods and transient groups are being categorized method developed by Dr. John Ford in British Columbia, Canada. This process involves arbitrary acoustical identification paired with a visual and statistical comparison of sound spectra.

Continued assessment of repertoires of Prince William Sound killer whales will occur in 2002. A publication detailing the linkage of dialect and genetic data has been

journal submitted and is in review (Jurk et al, in review). While similarities of mitochondrial DNA sequences or overall genetic similarity describes relatedness of pods within the past 10,000 to 20,000 years, dialects reflect the more recent history of community divergence. In addition, recordings from the remote hydrophone obtained in winter 2001-02 will be analyzed.

In order to detect the movements of killer whales into the Kenai Fjords region during the early and late winter months in recent years, our remote hydrophone has operated in the Thumb Point area of Resurrection Bay. An anchored and encased cable runs from the transmitter on shore to the hydrophone at a depth of about 30 meters. A microwave transmission system relays acoustic signals to Seward where they are monitored by a technician and also broadcast on local FM band. The system is operated by a combination of wind and solar power coupled with storage batteries.

During summer months the hydrophone will be monitored from the R.V *Natoa* as possible as an aid in locating whales. During the summer and winter months in Kenai Fjords it will be monitored in Seward on a regular basis via receiver equipped with a recording system. The receiver will be monitored on a regular scheduled basis with a standardized monitoring log completed that includes hours monitored and hours when whales were present. Whale calls will be recorded by M. Brittain in Seward and analyzed by Harald Yurk at the University of British Columbia.

Most equipment needed to complete the contracted field research will be provided by the North Gulf Oceanic Society, including binoculars, nets, directional hydrophones, photographic equipment and biopsy equipment. Remote hydrophone equipment and maintenance of that equipment will be provided by contract to See More Wildlife Systems. PC (Windows) compatible computers owned by NGOS will be used to record field data and in analysis. The GIS system at Alaska Pacific University (Dr. David Scheel) and U.F.W.S, Marine Mammal Management Division in Anchorage (Doug Burn) and VAX data system at the Pacific Biological Station, Nanaimo also will be used for data storage and analysis.

C. Contracts and Other Agency Assistance

The entire project will be completed under the auspices of the North Gulf Oceanic Society(NGOS) under federal research permits held by NGOS and issued under the Marine Mammal Protection Act. NGOS will provide a technician to enter data collected in 2002 into the GIS database housed at Alaska Pacific University and U.S.F.W.S. in Anchorage using the a preexisting menu interface. Graeme Ellis at the Pacific Biological Station in Nanaimo, B.C. Canada will complete final identifications of individuals and compare with data bases from other regions. Harold Yurk at the University of British Columbia will conduct acoustic analysis. Monitoring the remote hydrophone system will be a cooperative project with Mike Brittian and the Alaska Sea Life Center. The North Gulf Oceanic Society will contract the research vessel used in this project.

SCHEDULE

A. Measurable Project Tasks for FY2002

January 2002: Summarize monitoring fieldwork for 2001.

Nov. 1, 2001 - Jan. 31, 2002: Analysis of photographs from 2001 fieldwork. Input data into GIS system.

January 2002: Acoustic analysis of killer whale calls from previous year.

Oct. 1, 2001- May 1 2002: Preparation and submission of paper on population dynamics of killer whale pods.

January 1- April 15 2002: Prepare annual/final report

January 2002: Attend EVOS Trustee Council annual workshop

Oct. 1 2001- May 15 2002: Continue winter recordings in Seward from remote hydrophone.

May -Sept. 2002: Killer whale monitoring emphasis field work. Monitor remote hydrophone from research vessel as possible.

The R.V.*Natoa* will operate for 50+ selected days in May, July, August and September. The primary function of this vessel will be killer whale photoidentification monitoring. Time periods is selected are based on historical periods of high encounter rate with AB pod, other resident pods and the AT1 transient group and sighting reports from tourboat operators. Operational expense for additional field days will be funded by other monies.

B. Project Milestones and Endpoints

The FY2002 killer whale project will continue the reduced annual photoidentification monitoring program and the acoustic monitoring program initiated in FY1997. Future fieldwork will involve population monitoring and acoustic monitoring and regular publications of results.

C. Completion Date

Killer whale monitoring and remote hydrophone projects are completed on an annual basis, however they are envisioned as ongoing elements of the GEM program.

PUBLICATIONS AND REPORTS

Matkin, C.O., G.E. Ellis, and E. Saulitis. Population dynamics of resident killer whales in the Prince William Sound/Kenai Fjords region. To be submitted to Marine Mammal Science. (Held over from previous year)

PROFESSIONAL CONFERENCES

Bienniel Conference of the Biology of Marine Mammals, Vancouver, B.C. Canada November 2001 (funded from FY 2001)

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

The monitoring of killer whales and analysis of historic and current data on killer whale behavior is part of an program to investigate killer whale recovery and the interactions of killer whales and harbor seals. It will be integrated with the concurrent harbor seal studies. In FY2002 this project will rely on approximately \$11,000 in matching funds from other sources. As a non-profit research institution familiar with private funding sources and cooperative programs, NGOS can work with the Trustee Council cooperation to maximize potential for other funding in the future.

PROPOSED PRINCIPAL INVESTIGATOR:

Craig O. Matkin North Gulf Oceanic Society 60920 Mary Allen Ave, Homer, Alaska 99603 Phone/Fax (907) 235-6590 comatkin@xyz.net

KEY PERSONNEL

Craig Matkin (M.S. University of Alaska), is the project leader. Matkin will be responsible for supervising the completion of all fieldwork and insuring successful operation of boats and equipment. He will be the operator of the R.V. *Natoa* and supervise directly all work completed from that platform. He will direct data analysis and assemble all material for annual and comprehensive reports and be responsible for completion and submission of these reports. He will represent this project and present the work to the EVOS Trustee Council.

Matkin has studied killer whales in Prince William Sound since 1977. He initiated systematic killer whale photoidentification in Prince William Sound, and is a founding member of NGOS. In 1994 he completed the "The Biology and Management of Killer

Whales in Alaska" for the U.S. Marine Mammal Commission. Other pertinent publications include EVOS killer damage assessment results ("The Status of Killer Whales in Prince William Sound 1984-1992", Craig O. Matkin, G. M. Ellis, M.E. Dahlheim, and J. Zeh in T.R. Loughlin. ed. Marine Mammals and the *Exxon Valdez* and Matkin and C.O., Matkin, D.R., Ellis, G.M., Saulitis, E. and McSweeney, D. 1997. Movements of resident killer whales in Southeastern Alaska and Prince William Sound, Alaska. Marine Mammal Science, 13(3):469-475. Mr. Matkin also teaches at the University of Alaska, Lower Kenai Penninsula Campus.

Eva L. Saulitis (M.S. University of Alaska), a director of NGOS, has conducted fieldwork on killer whales in Prince William Sound each season since 1987. She is a principal field biologist for the monitoring segment of this project (photoidentification) and will co-operate the research vessel *Natoa*. She will make ready and maintain all necessary equipment, complete photoidentification work and all logs and data sheets as required. She will provide entry of field data into the GIS system.

Saulitis completed her MS thesis "The Behavior and Vocalizations of the AT Group of Killer Whales in Prince William Sound, Alaska." in 1993. She coauthored the "Biology and Management of Killer Whales in Alaska" for the U.S. Marine Mammal Commission and "Killer Whales" for the EVOS Restoration notebook series and authored Saulitis, E.L., C.O. Matkin, K. Heise, L. Barrett Lennard, and G.M. Ellis. 2000. Foraging strategies of sympatric killer whale (*Orcinus orca*) populations in Prince William Sound, Alaska. Marine Mammal Science16(1):94-109. She has done extensive analysis of killer whale calls and has operated research vessels in Prince William Sound since 1988.

Graeme Ellis has participated in killer whale photoidentification studies in Canada and Alaska for 24 years. Ellis will do all final identifications of individual killer whales. He will examine all negatives on a repetitive frame by frame basis and supervise the input of the final identification data into the VAX computer system. With Matkin he will update all life history information on individual whales and provide positive identifications from photographs of each whale biopsied.

Currently Ellis directs whale identification work at the Pacific Biological Station in Nanaimo, British Columbia and has done final identifications on Prince William Sound killer whale photographic negatives since 1983. He has more experience than any other individual identifying Prince William Sound killer whales from photographic negatives and his accuracy has been certified by repeated testing.

Harold Jurk Harald is a Phd. candidated at the University of British Columbia and specalizing in cetacean acoustics. He is conducting analysis and interpretation of killer whale acoustic data collected over the past 13 years in Prince William Sound/Kenai Fjords from vessels and from remote hydrophones.

LITERATURE CITED

- Matkin, C.O., D. Scheel, G. Ellis, L. Barrett-Lennard, H. Jurk, and E. Saulitis. 2000. Photographic and Acoustic Monitoring of Killer Whales in Prince William Sound and Kenai Fjords, Alaska (Restoration Project 99012), North Gulf Oceanic Society, Homer, Alaska
- Matkin, C.O., Ellis, G.M., Saulitis, E.L., Barrett-Lennard, L.G., & Matkin, D. 1999. Killer Whales of Southern Alaska. North Gulf Oceanic Society, Homer, Alaska.
- Saulitis, E.L., F. H. Fay, C O. Matkin, in review. Acoustical Behavior of the AT1 Transient Killer Whale Population in Prince William Sound and Kenai Fjords, Alaska. Animal Behavior.
- Scheel, D., C. Matkin, E. Saulitis. In press 2001. Distribution of killer whale pods in Prince William Sound, Alaska over a thirteen-year period, 1984-1996. Marine Mammal Science 17(3): July 2001.
- Ylitalo, G.M., C.O. Matkin, J. Buzitis, M. M. Krahn, L. L. Jones, T. Rowles, and J. Stein. in press. Influence of Life-History Parameters on Organochlorine Concentrations in Free-Ranging Killer Whales (*Orcinus orca*) from Prince William Sound, Alaska.. The Science of the Total Environment.
- Yurk, H., L. Barrett-Lennard, J.K.B. Ford, And C.O.Matkin. in press. Parallel cultural and genetic lineages in resident killer whales off the coast of Southern Alaska. Animal Behavior.

Proposed Project Manager Stacy Masters DOC,NOAA, NMFS, F/AKRX5 P.O. Box 21668 Juneau, Alaska 99802-1668 Phone 907 586-7644

FY 02 EXXON VALDEZ TRUS **OUNCIL PROJECT BUDGET** October 1, 2001 Juplember 30, 2002 Proposed Authorized Budget Category: FY 2002 FY 2001 \$27,690.0 Personnel Travel \$2,350.0 \$26,200.0 Contractual \$7,290.0 Commodities Equipment \$0.0 LONG RANGE FUNDING REQUIREMENTS \$63,530.0 Estimated Subtotal \$0.0 Indirect \$6,353.0 FY 2003 Project Total \$69,883.0 \$70,000.0 \$0.0 Full-time Equivalents (FTE) 0.7 Dollar amounts are shown in thousands of dollars. Other Resources \$11,000.0 Comments: Matkins time includes 1.5 mo field time/ 1.5 months analysisand report time Saulitis time includes 1.7 mo field time/ 0.5 mo office time FORM 4A Project Number: 00242 02-012-BAA **FY02 Non-Trustee** Project Title: Killer Whale Monitoring SUMMARY Name: North Gulf Oceanic Society Prepared: ð

FY 02 EXXON VALDEZ TRUS October 1, 2001

COUNCIL PROJECT BUDGET

Personnel Costs:				Months	Monthly		Proposed
	Name Position Description			Budgeted	Costs	Overtime	FY 2002
	Craig O. Matkin	P.I., Field Biologist		3.0	4600.0		13,800.0
	Graeme Ellis	Photo Analyst		0.9	3500.0		3,150.0
	Eva Saulitis	Field Biologist, Data technician		2.4	3000.0		7,200.0
	Harald Jurk	Acoustic Analyst		0.6	3400.0		2,040.0
. 4.5		Field Assistant/Office Assistant		1.0	1500.0		1,500.0
1997 1997 1997							0.0
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977							0.0
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11.000		ISubtot		7.9	16000.0	0.0	
 			A State of the sta	7.0	Per	rsonnel Total	\$27,690.0
Trav	vel Costs:		Ticket	Round	Total	Daily	Proposed
	Description		Price	Trips	Days	Per Diem	FY 2002
	Homer/Seward/Homer (car	travel)	140.0	5			700.0
	Homer/Vancouver/Seattle/Homer Homer/Anchorage/Homer			1	3	90.0	1,020.0
				2	3	100.0	630.0
							0.0
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		•					0.0
							0.0
							0.0
							0.0
							0.0
						Travel Total	\$2,350.0
	FY02 Project Number: 00212						FORM 4B
1							Personnel
Name: North Gulf Oceanic Society							& Travel
							DETAIL

Prepared:

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FY 02 EXXON VALDEZ TRUS October 1, 2001

COUNCIL PROJECT BUDGET

Contractual Costs:	Proposed
Description	FY 2002
- SeeMore Wildlife (Remote hydrophone/equipment lease/maintanance) 34' research vessel (Natoa) 50 days@430/day	4,700.0 21,500.0
Contractual Tota	\$26,200.0
Commodities Costs:	Proposed
Description	FY 2002
Phone Field Food \$16/person/day Computer Services Fuel Film/Processing/Printing Field Supplies Shipping	200.0 1,800.0 120.0 3,100.0 1,600.0 350.0 120.0
Commodities Tota	I \$7,290.0
FY02 Project Number: 00212 C Project Title: Killer Whale Monitoring C Name: North Gulf Oceanic Society C	FORM 4B ontractual & ommodities DETAIL

Prepared:

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FY 02 EXXON VALDEZ TRUS SOUNCIL PROJECT BUDGET

October 1, 2001 ____tember 30, 2002

New Equipment Pure	chases:	Number	Unit	Proposed
Description		of Units	Price	FY 2002
				0.0
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				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
			-	0.0
				0.0
				0.0
Those purchases ass	ociated with replacement equipment should be indicated by placement of an R.	New Equ	ipment Total	\$0.0
Existing Equipment U	sage:		Number	
Description		-	of Units	
			<u></u>	1 <u>1997 - 1997 - 1997 - 1997 - 1997 - 1997</u>
			F	
	Project Number:			quinment
FYU2	Project Title:			
	Name:			
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Prepared:	· · · · · · · · · · · · · · · · · · ·			

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02052

Community Involvement Planning for GEM

Project Number:	02052
Restoration Category:	General Restoration
Proposer:	P. Brown-Schwalenberg/CRRC
Lead Trustee Agency:	ADFG
Cooperating Agencies:	None
Alaska SeaLife Center:	No
New or Continued:	Continued
Duration:	8 th year, 8 year project
Cost FY 02:	\$200.2
Geographic Area:	All
Injured Resource/Service:	Subsistence

APR 1 3 2000 EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

ABSTRACT

In FY 02, this project will continue to actively involve residents of the Alaska Peninsula Region/Chignik Lake, Chenega Bay, Cordova (Eyak), Kodiak Island Region/Ouzinkie, Nanwalek, Port Graham, Seward (Qutekcak), Seldovia, Tatitlek, and Valdez in the restoration program through a network of local Community Facilitators. In addition, the project will work to address the future of community involvement with regard to the Gulf Ecosystem Monitoring (GEM) Program. In FY 02, the Community Involvement Project will focus on three objectives: (a) designing a community based research and monitoring program, (b) identifying specific research and monitoring activities that fit within the GEM program, and (c) developing possible pilot projects for FY 03.

INTRODUCTION

This proposal is designed to continue with the original community facilitation efforts and objectives, but to a lesser extent since the restoration effort is declining. In addition, this proposal builds on the initial work in FY 00 to enhance the stewardship capacity of the Native community and create a long-term community monitoring component of the Gulf Ecosystem Monitoring (GEM) Program. This proposed project will examine the communities' interests, priorities and activities through their Tribal Natural Resource Management Programs and how these will relate to the future GEM Program. Candidate projects emerging from our planning effort will exhibit a blend of modern measurement science and traditional observation, which will be beneficial to both the GEM Program and the Tribal Natural Resource Management Programs.

Ten Community Facilitators were hired in FY 97 through cooperative agreements with the Village Councils of Chenega Bay, Chignik Lake (Alaska Peninsula Region), Eyak (Cordova), Nanwalek, Ouzinkie (Kodiak Island Region), Port Graham, Qutekcak (Seward), Seldovia, Tatitlek, and Valdez to involve communities in the EVOS restoration process. The Spill Area Wide Community Involvement Coordinator worked with the Community Facilitators to promote communication between the EVOS Trustee Council, the communities, and the scientists. Their efforts continued through FY 00 and FY 01 while five pilot communities (Cordova, Nanwalek, Ouzinkie, Port Graham, and Tatitlek) also branched into developing Tribal Natural Resource Management Plans, designed to assist the communities in having a more active role in the Trustee Council's research and monitoring efforts. These pilot communities were funded at a higher level for the additional work required.

In FY 00, workshops were held to further develop the technical capacity of the communities in the Chugach Region and spill area. This increased capacity is a key component in their efforts to ensure the sustainability of their subsistence resources. One workshop was held in December between the village corporations and Tribes to discuss ways of cooperative management of village corporation lands. Additionally, the corporations and Tribes in Prince William Sound have been working extensively with the United States Forest Service to ensure their involvement in the Chugach National Forest Management Plan Revision currently underway. Cooperative and collaborative management of lands and resources have been actively discussed and strategies for further developing a formal relationship are underway. The final draft of the Chugach National Forest Management Plan is scheduled for public comment in the spring of 2001. In FY 00, the pilot communities, as well as Chenega Bay, Qutekcak, and Stevens Village Council traveled to Lac du Flambeau, Wisconsin to observe the Tribal natural resource research and monitoring program currently being conducted by the Lac du Flambeau Band of Lake Superior Chippewa Indians. This trip was an effort to model the Tribal Natural Resource Management Programs in the spill area after the Lac du Flambeau Program, and encourage more involvement in the community research and monitoring aspects of the GEM Plan.

In FY 01, the CRRC Board of Directors held a strategic Planning Session. During this meeting they identified Natural Resource Management Plan development along with the EVOS \$20 million Tribal Community Fund as top priorities of CRRC. The Board of Directors also prioritized the communities' involvement in GEM and community involvement/Traditional Ecological Knowledge, indicating their interest in remaining involved in the EVOS process. In October of 2000 the Community Facilitators, Natural Resource Specialists, Science Advisor, Principal Investigator, TEK Specialist, and Spill Area Wide Community Involvement Coordinator (currently the Community Development Director) all participated in the GEM Workshop, advocating for meaningful community involvement and TEK being incorporated into the GEM Plan/Program. In March 2001 the Principal Investigator and Community Development Director in cooperation with the Chugach Alaska Corporation, Chugachmiut, and the North Pacific Rim Housing Authority organized the Chugach Regional Summit on Natural Resources for participation by the Board of Directors of the Chugach Region Native corporations, Tribal Councils, and regional organizations. The Community Facilitators and Natural Resource Specialists also participated. During this Summit the communities identified barriers, and developed solutions, for the Tribal Natural Resource Management Programs and discussed ways to assist in creating cooperative relationships between the Tribes and Native corporations in the area of jurisdiction, enforcement and management of natural resources. Furthermore, community meetings are scheduled in the villages of Port Graham, Nanwalek, and Ouzinkie in April 2001 and in Cordova in September 2001 to discuss their Tribal Natural Resource Management Plans and identify common objectives between their Management Plans and the GEM Plan.

In FY 02, specific tasks for the communities will be to continue the original community facilitation efforts (to a lesser degree) and participate in GEM planning and implementation. Additionally, the five pilot communities will work with project staff to identify common areas of interest between the Tribal Natural Resource Programs research and monitoring efforts and GEM Program's efforts. Once these common areas of interest are identified, the scientific staff and communities will develop methods by which communities can take on specific research and monitoring activities of GEM, while leveraging other funds to implement other aspects of their Management Plans.

Sarah Ward, the Community Development Director (formally know as the Spill Area Wide Community Involvement Coordinator), will continue to coordinate the project out of the Restoration and CRRC offices, to accomplish the following tasks:

- 1. Continue the involvement of community members and local Tribal Natural Resource Programs throughout the spill region in current restoration projects. This community process will require a Community Facilitator, whose duties will be described later. Since the restoration effort is declining, this will be a smaller function in FY 02.
- 2. Serve as contact point for the Community Facilitators and Natural Resource Specialist in each of ten participating communities (Alaska Peninsula Region/Chignik Lake, Chenega Bay, Cordova, Kodiak Island Region/Ouzinkie

Nanwalek, Port Graham, Seldovia, Seward, Tatitlek, and Valdez). The tasks for the Community Development Director in relation to the Community Facilitators will be to:

- a. Once a month, send a brief activities report to the Community Facilitators and Tribal Natural Resource Management Programs to keep them informed of Trustee Council actions, Restoration Office activities, upcoming events, new research findings, update on current projects, and all other pertinent information. The report could take the form of bullets or a newsletter with contact information on each issue.
- b. Coordinate the participation of the Community Facilitators in the annual restoration workshop and serve as the lead coordinator for the Monitoring Committee planning effort.
- 3. Provide input at the Restoration Work Force and Public Advisory Group meetings.
- 4. Assist in organizing Trustee Council/Restoration Office community meetings. This may include arranging presentations in specific communities.
- 5. Attend (in person or by teleconference) all Trustee Council meetings and report to the Community Facilitators on actions taken.
- 6. Coordinate and provide technical assistance to the villages to develop project proposals.
- 7. Prepare quarterly project status reports and ensure all annual/final reports are submitted on a timely basis by the affected communities.

The specific tasks the Community Facilitators are expected to undertake include the following:

- 1. Inform the Community Development Director of community issues, concerns, or questions regarding restoration. These issues could be identified through community meetings conducted by the Community Facilitators, or through other means, and could include ideas to form new projects.
- 2. Work with the Community Development Director in coordinating Trustee Council community meetings as well as community visits from Project Principal Investigators. The Community Facilitator will also serve as the initial contact in the village for any project conducted by EVOS Principal Investigators in the traditional use areas of the communities.
- 3. Work closely with the Village Council's Tribal Natural Resource Management Program to coordinate all activities that have a direct impact on the local community resources and any research projects that will complement the Tribe's traditional knowledge of the traditional use areas.

- 4. Disseminate to community members the monthly update from the Community Development Director.
- 5. Attend the annual Restoration Workshop, Native American Fish & Wildlife Society Conference, and associated meetings, including certain scientific review sessions.
- 6. Provide a quarterly report to the Community Development Director identifying community issues, concerns, or questions regarding restoration. These issues could be identified through community meetings or other means and should include relevant issues discussed at Village Council meetings. Ideas for new projects should also be included. The content of the reports will decline as the overall restoration program declines.
- 7. Additionally, the five pilot Community Facilitators will work with project staff to develop common areas of interest between the Tribal Natural Resource Management Programs, their Management Plans, and the GEM Program.

The specific tasks for the Traditional Ecological Knowledge (TEK) Specialist will be to:

- 1. Assist in developing the community monitoring program, particularly exploring opportunities for incorporating community expertise and TEK into the monitoring program as a whole as well as into specific monitoring activities.
- 2. Assist other Principal Investigators, as requested, in incorporating TEK into their proposals and research as appropriate, and working with the Tribal Natural Resource Management Programs.
- 3. Assist spill area communities and the Community Facilitators, as requested, in developing methods for documenting TEK and otherwise incorporating it into research and monitoring programs related to the Restoration Program and GEM.
- 4. Provide other assistance as necessary to the project and to the Community Development Director.

The specific tasks for the Scientific Advisor will be to:

- 1. Work with the communities to identify GEM related Projects within their Tribal Natural Resource Management Plans. Help develop the conceptual outline for a comprehensive community-based research and monitoring program in the five pilot project communities and identifying any necessary training.
- 2. Help coordinate the community-based research and monitoring with other research and monitoring activities planned under GEM and coordinate community input in the GEM Plan.

- 3. Help develop additional research and monitoring ideas outside of GEM to meet community interests in resource stewardship.
- 4. Serve as the liaison with other scientists as appropriate to get community input in the design and implementation of the GEM Program.

NEED FOR THE PROJECT

A. Statement of Problem

Marine bird, fish and mammal stocks are believed to be profoundly influenced by the marine environment that hosts them and the food-webs that support their production. Variations in annual production and species composition associated with cycles and shifts in ocean climate have been documented. To meet the mission of GEM, the physical condition of the northern Gulf of Alaska and selected target populations must be carefully tracked through time. The emerging "historical records" provide important insight about how the ecosystem responds to environmental fluctuations on scales from weeks and months to decades and ideally centuries. GEM monitoring will be strengthened significantly by the addition of coastal observations in the many sub-environments stretching from Prince William Sound to the Alaska Peninsula. There is a critical need to establish a long-term observational program in coastal waters because the edge-zone of the northern Gulf is used by many sport, subsistence and commercial resources as reproductive and nursery habitat.

In Addition, the Exxon Valdez oil spill caused severe disruption of the lives of many people living in the spill impacted area. The oil spill also caused residents of the area to be concerned about the safety of their wild food sources, and the integrity of the surrounding natural environment. While scientific studies aimed at restoring the resources and services damaged by the oil spill have occurred throughout the spill area, most of the researchers work for agencies or institutions based in Anchorage, Fairbanks, or outside Alaska. Residents have voiced concern over a lack of involvement by spill area communities in the restoration efforts, and incomplete communication to spill area inhabitants of study proposals and results. While the past several years have facilitated an increasing amount of communication between the scientists and the communities, there still exists a void for meaningful involvement in the restoration process by the community members at the grass roots level. At the same time, researchers have recognized that local residents have traditional knowledge that could help them answer questions they have not been able to answer through conventional scientific means. In addition, communities in the spill area are very concerned about the long-term stewardship and management of lands and resources important to their subsistence way of life. These communities have been developing their Tribal Natural Resource Management Programs at the local level to ensure long-term health of injured oil spill species, important subsistence resources, and responsible management of lands in proximity to their villages and traditional use area. The Gulf Ecosystem Monitoring Plan is also very concerned with the ecosystem and coordination between the communities and the Trustee Council regarding community-based monitoring and will be necessary to effectively monitor and document change in the Gulf of Alaska ecosystem. Furthermore, the EVOS Trustee Council has recognized the need to increase communication and community involvement in the restoration process. This was stressed throughout the GEM Workshop, held in Anchorage in October 2000 (Exxon Valdez Oil Spill Trustee Council, 2001). The National Research Council also sited the need for meaningful community involvement in their Interim Report (National Research Council, 2001). During the Public Advisory Group's April 4, 2001 meeting, the integration of community involvement into the GEM Program was identified as a top priority (Exxon Valdez Oil Spill Trustee Council, 2001). Therefore, it is evident that the integration of Tribes, their Natural Resource Programs, community research and monitoring, and GEM must take place in order to ensure meaningful community involvement in the GEM Program. The specifics of how this will occur have yet to be determined, but it is evident that meaningful community involvement must be defined by the communities.

B. Rationale/Link to Restoration

This project furthers the Trustee Council's goals of facilitating the involvement of spill area residents and resource users in the restoration process. It also reaffirms the Trustee Council's dedication to the involvement of people living in the oil spill affected areas in the restoration process.

In addition, people living in the spill area have detailed knowledge about the condition of resources, which can significantly add to data collected as part of scientific studies, and enhance the success of restoration efforts. Local people have expressed a desire to be involved in all aspects of restoration projects, and a willingness to work with researchers. The Tribes in the Chugach Region and the Ouzinkie Tribe are in the process of developing Tribal Natural Resource Management Plans. These plans are leading the way for the creation of methods and projects that will ensure the continued abundance of subsistence resources important to their communities. Five of those plans will be completed in FY 01. These Plans form the basis for development of Tribal Natural Resource Management Programs. The Tribal Natural Resource Management Plans outline overall interests of the communities, including economic development, traditional use area management, and various other aspects of their Natural Resource Management Programs. The Chugach Tribes are also currently working with the Chugach Regional Resources Commission to develop an Inter-Tribal Integrated Natural Resource Management Plan. This plan will coordinate all the Tribal Plans to provide a format for the Tribes to work cooperatively to address issues related to management, monitoring and research of their traditional use areas. Both the Tribal and Inter-Tribal Integrated Natural Resource Management Plans will be instrumental in planning for participation in the GEM community-based research and monitoring programs. GEM must integrate local Resource Management Plans and Programs into the overall GEM Program to effectively monitor environmental conditions and indicator species. This project would open communication lines and help facilitate the interaction between the different entities.

At present, the only systematic and year-round monitoring program of ocean conditions in the northern Gulf of Alaska is maintained in outer Resurrection Bay by the Institute of Marine Science, University of Alaska Fairbanks (GAK-1 station) and in Cook Inlet by Cook Inlet Keepers. Also, some seasonal records of temperature and plankton volumes have been made over the years by aquaculture corporations in Prince William Sound, lower Cook Inlet, and at Kodiak. These observations, coupled with those undertaken by several private organizations in the region provide evidence that citizen monitors can be important contributors to long-term programs, but also demonstrate that to be effective, these efforts must be standardized and coordinated over time, which can be accomplished through the GEM Program. Furthermore, resource managers will benefit greatly from any new information arising from GEM and other coastal monitoring programs, such as information and data generated by the Tribes.

C. Location

This project will be spill area wide. All communities will have a local Community Facilitator, with the exception of the Alaska Peninsula and Kodiak, which will be covered by a region-wide Community Facilitator. Five communities will be pilot project communities. These include Eyak, Nanwalek, Ouzinkie, Port Graham, and Tatitlek. Chenega Bay, Chignik Lake, Qutekcak, Seldovia, and Valdez will continue to perform their normal Community Facilitator duties. The pilot communities will begin the process of identifying common areas of interest between the Tribal Natural Resource Management Programs and the GEM Program. Once they are in place, the other communities will be incorporated into the process. Other regional, Native, and community organizations will be encouraged to participate and mold the parameters for the monitoring programs.

The project's benefits will be realized both in meaningful involvement by the communities and their Tribal Natural Resource Management Programs, and in the restoration of the injured resources. Better communication among the Trustee Council staff, researchers, and residents of the communities impacted by the spill should improve the effectiveness of restoration efforts and the future GEM Program.

COMMUNITY INVOLVEMENT AND TRADITIONAL KNOWLEDGE

The core of this project is the incorporation of community involvement and traditional knowledge into the EVOS restoration process and the GEM Program. Communities will be informed of EVOS projects, research findings, and provide input into the Trustee Council process through a network of Community Facilitators, the Community Development Director, TEK Specialist, Principal Investigator, and Science Advisor. The Community Facilitators will be hired locally.

PROJECT DESIGN

A. Objectives

The objectives of the project will be to:

- 1. Increase the meaningful involvement of spill area communities in the restoration efforts of the Trustee Council.
- 2. Improve the communication of findings and results of restoration efforts to spill area Village Councils, inhabitants and the appropriate regional organizations. It is expected that by doing so, this project will increase the effectiveness of overall restoration efforts.
- 3. Develop a means by which western science and traditional ecological knowledge can be compiled and utilized in a cooperative manner with the intent of furthering the restoration process in a way that is sensitive to the needs of the affected communities.
- 4. Provide community input into the plans for GEM, including review of drafts and suggestions for community-based activities such as research and monitoring, education, data sharing, and outreach. Part of this objective will be met at the EVOS Restoration Workshop, which will be held in January of 2002 in Anchorage, and in specific communities at other times, and part will be accomplished by correspondence amongst Project Staff. The Tribes will also work with the Trustee Council to define meaningful community involvement. The communities' research and monitoring programs, developed in conjunction with their Tribal Natural Resource Management Programs, will include more than is relevant to GEM. This activity will help promote close cooperation in the development of research and monitoring ideas under GEM and otherwise, so that the programs and projects that are undertaken benefit each other as much as possible.
- 5. Use the above to help further the design of a community-based monitoring program. A community-based or citizen monitoring program requires mechanisms for (a) identifying and selecting monitoring activities, (b) developing appropriate methods for the various parameters to be monitored, (c) training monitors and ensuring the quality of data collected, (d) submitting, managing, archiving, and accessing the data generated, (e) providing results and other feedback to EVOS, and (f) jointly evaluating the approach and results of the monitoring effort on a regular basis with EVOS. In FY 02, this project seeks to develop a conceptual model for the structure, scope, scientific guidance, community involvement, cost, funding, and other aspects of establishing and maintaining a community monitoring program under the GEM Program.
- 6. Compare the research parameters of the GEM Program to the Tribal Natural Resource Management Plans, to identify where their interests in research and monitoring overlap. This information will then be used to identify ways that the

EVOS Trustee Council and the Tribes can work together in order to meet their common objectives.

7. Select possible monitoring activities for pilot projects in FY 02 and FY 03. After designing the program and identifying what can be monitored, we will select certain monitoring activities to carry out in FY 03 (i.e., to include in our proposal for FY 03) to test the system. This test will help us evaluate and refine our overall program and aid in the selection of long-term monitoring activities under GEM as well as under other funding programs.

B. Methods

The Community Development Director hired by the Chugach Regional Resources Commission, and the Community Facilitators, in close coordination with the Tribal Natural Resource Programs, will implement the project. Additionally, outreach to all parties involved in community monitoring programs throughout the spill area will be invited and encouraged to participate in the process of developing the parameters of the program.

The objectives will be achieved using the following methods:

- 1. A contract will be renewed by ADF&G Subsistence Division to CRRC for overall coordination of the Community Facilitators and Community Development Director. The contractor will be expected to arrange for the hiring (where applicable) and coordination of Community Facilitators in the communities of Chenega Bay, Cordova, Nanwalek, Port Graham, Seward, Seldovia, Valdez, and regional Facilitators for the Alaska Peninsula and Kodiak Island regions.
- 2. Working with the Community Facilitators, the Community Development Director will strive to further the goal of community outreach. The goal of community outreach will be to continue the partnership, which began under 95052 between the people residing in the oil spill affected region and scientific researchers. Outreach will include communication of traditional knowledge and local interests, as well as communication of research proposals and study results. Outreach and community interest in the GEM Program will be a large effort of the Community Development Director.
- 3. Define meaningful community involvement in the GEM Program.

Use results of #3 to help further design a community-based monitoring program for the communities. The Monitoring Committee will be composed of the Community Development Director, the Principal Investigator, the TEK Specialist, the Science Advisor, and a Community Facilitator from two of the five pilot communities. The Committee will develop a list of parameters to use for monitoring and research, which would form the basis for a community component of GEM. We will then invite scientists working on the design of GEM and especially its data management procedures to meet. At this meeting, we will develop the conceptual outline of a monitoring program, addressing the points outlined in the Objectives section above. The Community Development Director, TEK Specialist, selected Community Facilitators, and the Scientific Advisor will prepare for the meeting and be responsible for using the results of the workshop to develop a detailed model for the monitoring program.

- 4. Select activities for pilot projects in FY 03. By March 2002, we will select pilot projects for FY 03. These projects will be chosen on the basis of their relevance to community interests, their scientific merit, and their ability to help evaluate the design of the monitoring program as a whole. This may or may not include monitoring and focus instead on some other part of GEM.
- 5. Further work in FY 02. Once we have accomplished the above tasks, we will continue its work after submitting a proposal for FY 03. Depending on the outcome of the above activities, we may do one or more of the following: (a) identify other sources of funding for monitoring activities, (b) continue to refine the ideas presented in the monitoring program design and the specific monitoring activities, (c) explore closer ties with monitoring plans by scientists involved with GEM and others, and (d) explore closer ties with community-based research and monitoring programs, Tribal Natural Resource Management Programs, and citizen monitoring projects currently being developed.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

A contract will be let to CRRC for overall coordination of a facilitator network through a Community Development Director. The contractor will be expected to arrange for the hiring and coordination of local facilitators in the communities of Chenega Bay, Cordova, Nanwalek, Port Graham, Seward, Seldovia, Tatitlek, Valdez, and regional coordinators for the Alaska Peninsula and Kodiak Island regions. However, all other communities in the oil spill impacted area will also be included in outreach efforts, even though a Community Facilitator will not be hired in each community. Additionally, CRRC will contract with Dr. Henry Huntington to serve as the TEK specialist and Dr. Ted Cooney to serve as the Science Advisor.

SCHEDULE

A. Measurable Project Tasks for FY 02 (October 1, 2001 – September 30, 2002)

Contract with CRRC and ADF&G Renewed.
Community Development Director continues CRRC
Subcontracts with Communities for Community
Facilitators renewed.
Contract with TEK Specialist renewed.
Contract with Science Advisor renewed.

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October 1-31, 2001:	MOU renewed between ADF&G & CRRC.
October – Jan. 2001:	Monitoring Committee prepares for the EVOS Restoration
	Workshop by developing parameters to be included in the GEM plan.
November to Jan. 2002:	Project Staff to review model, identify activities, and
	provide further input to latest GEM draft with
Ianuary 2002.	Meeting held with Project Staff and others to review GEM
January 2002.	draft and provide input, refine list of community interests and objectives, prepare for EVOS Restoration Workshop.
Jan. 14-23, 2001 (2 days):	Participate in EVOS Restoration Workshop, developing overall ideas for data archiving and access, citizen and community monitoring, and ideas and needs shared with other aspects of GEM.
Winter 2002:	List of activities compiled, organized, and evaluated.
March-April 2002: submitted.	Proposals for pilot projects for FY03 prepared and
May 2002:	Attend the Native American Fish & Wildlife Society Conference.
Spring-Summer 2002:	Model and list of activities completed and refined, other resources of finding sought, and link to community programs and scientific activities explored.

B. Project Milestone and Endpoints

October 2001:	Contracts in place.
	First Monitoring Committee meeting held.
January 2002:	Project Staff and others refine community
	involvement/monitoring parameters and attend the
	Restoration Workshop.
March 2002:	Pilot projects identified and selected.
April 2002:	Pilot project proposals submitted.
April 2003:	Final report submitted to EVOS.

C. Completion Date

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September 30, 2002.

PUBLICATIONS AND REPORTS

A final report will be compiled in coordination with the ADF&G and provided by CRRC on April 15th, 2003, describing and summarizing the progress and accomplishments of the Community Involvement Project. In addition, the Community Development Director will provide monthly reports to the participating communities and the Community Facilitators will supply the Community Development Director with quarterly reports.

PROFESSIONAL CONFERENCES

The Community Facilitators, Community Development Director, TEK Specialist, Science Advisor, and Principal Investigator will be attending the Native American Fish & Wildlife Society Conference, which will be held in Anchorage, May of 2002. The Conference will be focusing on community planning, natural resource monitoring, stewardship and how to integrate these initiatives with other monitoring efforts. This Conference will provide an excellent opportunity for the communities to examine other Tribal Natural Resource Management Programs and talk with people who are recognized as community involvement and community monitoring experts. Furthermore, Ms. Patty Brown-Schwalenberg, the Principal Investigator plans to give a presentation at the conference over the Community Involvement Project, Traditional Knowledge, and the Tribes' role in the upcoming GEM Program.

NORMAL AGENCY MANAGEMENT

Not Applicable.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This community outreach effort is in fact a novel effort to coordinate the Restoration Program with the Tribal Natural Resource Management Programs and builds on the established relationship between CRRC and the communities in Prince William Sound. Other organizations may be included, such as the Cook Inlet Keepers, Regional Citizen Advisory Councils, Kachemak Bay Research Reserve, Alaska Wilderness Recreation and Tourism Association, and various other organizations.

CRRC is contributing a considerable amount of in-kind services to the project. CRRC's Tribal Natural Resource Management Program development project has been operating for the past three years in four of the villages in the Chugach Region, and Ouzinkie. CRRC, through a BIA contract, is providing technical assistance in the villages to develop their Management Programs. The Native American Fish & Wildlife Society will be providing training and technical assistance through their Regional Conference and technical workshops. Part of the normal duties of the Natural Resource Specialists will be to collect traditional harvest and other baseline data (such as population assessments) on the resources in their traditional use areas.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

This Project continues in its basic function, having added the monitoring and resource management component in previous years. There have been some adjustments to the

schedule and scope of the project based on peer reviewer comments, community input, and the results of the project to date.

PROPOSED PRINCIPAL INVESTIGATOR

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Patty Brown-Schwalenberg, Executive Director Chugach Regional Resources Commission 4201 Tudor Centre Drive, Suite 300 Anchorage, Alaska 99508 Phone: 907-562-6647 Fax: 907-562-4939 Email: alutiiqpride@acsalaska.net

PRINCIPAL INVESTIGATOR

Patty Brown-Schwalenberg: Ms. Brown is the Executive Director of the Chugach Regional Resources Commission (CRRC) since 1994. She assists the Chugach Region Tribes in developing their Tribal natural resource programs, developing projects that stimulate the local community economy, and addressing issues and concerns directly related to subsistence and natural resources. She has worked for the past 19 years in such positions as Tribal Administrator for her Tribe, the Lac du Flambeau Band of Lake Superior Chippewa Indians, Society Administrator for the Native American Fish & Wildlife Society, Office Manager of the Bering Sea Fisheries Development Fund, and as a private consultant, assisting Alaska Native Tribes in obtaining funding for natural resource management programs, and setting up their natural resource program administrative systems. CRRC and the previous organizations that Ms. Brown has operated have consistently met all standards of proper management, including annual program and financial audits.

OTHER KEY PERSONNEL

Sarah L. Ward: Ms. Ward is the Community Development Director. Ms. Ward has her Bachelor of Arts Degree from the University of Alaska Anchorage in History with a Minor in Alaska Native Studies. She has experience in community involvement, providing a liaison function between Tribes, the state, and the federal government, living in and working with rural Alaska Native Tribes, grant writing, and providing technical assistance to Tribes regarding natural resource management and subsistence.

<u>Dr. Henry Huntington</u>: CRRC has contracted with Dr. Huntington to serve as the TEK Specialist. Dr. Huntington received his Ph.D. at the University of Cambridge (U.K.), Scott Polar Research Institute in Polar Studies. He has served as the Environmental Coordinator for the Inuit Circumpolar Conference (ICC), coordinating ICC policy regarding the Arctic Environmental Protection Strategy (AEPS), in cooperation with indigenous organizations in Russia and Scandinavia. He was also responsible for traditional ecological knowledge and other research projects under the auspices of the AEPS.

<u>Dr. Ted Cooney</u>: Dr. Cooney has recently retired from the University of Alaska-Fairbanks where he served on the faculty as a biological oceanographer for 29 years. Dr. Cooney has been involved with many studies of Alaska oceanic, shelf and coastal zooplankton stocks. He has worked on, and published extensively in the area of salmon oceanography. Most recently, Dr. Cooney was designated by the EVOS Trustee Council as the Lead Scientist for the Sound Ecosystem Assessment (SEA) Program in Prince William Sound, 1994-1999. His work with the juvenile salmon ecosystem over a 20-year period helped to create the spring-time plankton watch at hatcheries operated by the Prince William Sound Aquaculture Corporation.

LITERATURE CITED

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Exxon Valdez Oil Spill Trustee Council, "FY 2001 Annual Workshop, October 12th & 13th, 2000 Work Group Notes". Unpublished.

Exxon Valdez Oil Spill Trustee Council, "Exxon Valdez Oil Spill Public Advisory Group Meeting Summary". April 4, 2001. Unpublished.

National Research Council, <u>The Gulf Ecosystem Monitoring Program: First Steps</u> <u>Toward A Long-Term Research and Monitoring Plan</u>. Interim Report. February 2001. National Academy Press, Washington, D.C..

FY 02 EXXON VALDEZ TRI E COUNCIL PROJECT BUDGET

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October 1, 2001 - September 30, 2002

	Authorized	Proposed						
Budget Category:	FY 2001	FY 2002						
Personnel	\$37.5	\$50.0					State -	
Travel	\$22.1	\$22.1						
Contractual	\$110.0	\$100.0						
Commodities	\$2.0	\$2.0			医 医胰性			
Equipment		\$0.0		LONG RA	ANGE FUN	DING REQ		
Subtotal	\$171.6	\$174.1	Estimated					
Indirect	\$17.1	\$26.1	FY 2003					
Project Total	\$188.7	\$200.2	\$0.0					
							1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
Full-time Equivalents (FTE)	0.8	1.0						
			Dollar amounts are	shown in	thousands	of dollars.		
Other Resources								
Comments:								
Annual Restoration Attendance Report Writing - Not Applicable Publications - Not Applicable to Professional Conferences - 6% Society Conference to be held Community Involvement - 100%	 e 6% of the Project. b this Project. c this Project. d of the Project in Anchorage in % of the Project % of the Project 	oject Budget. Budget will go n May 2002. Budget.	towards the Projec	t Personn	el's attenda	nce at the	Native Americ	an Fish & Wildlife
FY02	Project Nu Project Titl Name: Ch	mber: 0205 e: Commun ugach Regi	2 ity Involvement onal Resources	Planning Commis	for GEM	1		FORM 4A Non-Trustee SUMMARY
Prepared: 4/5/01	L							1 of

FY 02 EXXON VALDEZ TRI E COUNCIL PROJECT BUDGET

October 1, 2001 - September 30, 2002

Personnel Costs:				Months	Monthly		Proposed
	Name	Position Description		Budgeted	Costs	Overtime	FY 2002
	Sarah L. Ward	Community Development Director		12.0	4.2	0.0	50.0
					}		0.0
					ļ		0.0
					1		0.0
							0.0
							0.0
							0.0
							0.0
							0.0
			- T				0.0
							0.0
					4.0		0.0
						0.0	\$50.0
			Tielet		Tetel		φ00.0
	Description		Price	Trips	Total	Daily Por Diom	EX 2002
	Port Graham - Anchorage				Days		1 2002
	Tatitlek - Anchorage		0.2	2	8	0.1	1.2
	Chenega Bay - Anchorage		0.5	2	8	0.1	1.8
	Seldovia - Anchorage		0.3	2	8	0.1	1.4
	Nanwalek - Anchorage		0.2	2	8	0.1	1.2
	Seward - Anchorage		0.2	2	8	0.1	1.2
	Cordova - Anchorage		0.3	2	8	0.1	1.4
	Valdez - Anchorage		0.2	2	8	0.1	1.2
	Ouzinkie - Anchorage		0.7	2	8	0.1	2.2
	Chignik Lake - Anchorage		0.7	2	8	0.1	2.2
÷.,	TEK Specialist/Community	Development Director/Science Advisor/					6.5
<u> </u>	Principle Investigator's trave	el throughout spill area					0.0
							\$22.1
Г						·	
		Droig of Numbers 02052				F	FORM 4B
FY02 Project Number: 02052						F	Personnel

Project Title: Community Involvement Planning for GEM Name: Chugach Regional Resources Commission

& Travel DETAIL

Prepared: 4/5/01

FY 02 EXXON VALDEZ TR E COUNCIL PROJECT BUDGET

October 1, 2001 - September 30, 2002

Contractual Cos	sts:		Proposed				
Description			FY 2002				
TEK Specialist &	Science Advis	sor	40.0				
Sub-contracts wi	th Tribal Coun	cils in spill Area (10 @ \$3,000) to provide facilitator and stewardship services	30.0				
Sub-contracts with Tribal Councils in spill Area (5 @ \$2,000) to participate in GEM planning and implementation							
Sub-contracts wi	th Tribal Coun	cils in spill Area (5 @ \$4,000) for Natural Resouce Management Plan integration with GEM	20.0				
		Contractual T	otal \$100.0				
Commodities C	osts:		Proposed				
Description	0010.		EY 2002				
Incidental costs for workshops (meeting space rental, supplies, food, etc.)							
ļ							
		Commedition To					
			nai \$2.0				
ſ	T						
	Droject Number: 02052		FURM 4B				
EV02			Contractual &				
IIUZ		Project Litle: Community Involvement Planning for GEM	Commodities				
		Name: Chugach Regional Resources Commission	DETAIL				
]						
Prepared:	4/5/01		3 of a				

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FY 02 EXXON VALDEZ TR E COUNCIL PROJECT BUDGET

October 1, 2001 - September 30, 2002

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FY 2002
			0.0
			0.0
	1		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	\$0.0
Existing Equipment Usage:		Number	, , , , , , , , , , , , , , , , , , ,
		of Units	
			1. A.
Project Number: 02052		F	FORM 4B
FY02 Project Title: Community Involvement Planning for GEM		E	quipment
			DETAIL
		L	
Prepared: 4/5/01			4 of

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COMMON MURRE POPULATION MONITORING

Project Number:	02144	DECEMED
Restoration Category:	Restoration Monitoring	RECEIVED
Proposer:	DOI-FWS	APR 1 2 2001
Lead Trustee Agency:	USFWS	EXXON VALDEZ OIL SPILL
Cooperating Agencies:	None	MOOTLE OOONOLE
Alaska SeaLife Center:		
Duration:	0.5 years	
Cost FY 01:	\$14.8K (estimated close-out Project 01144 data, preparing writing a final report)	costs for analyzing FY 01 g a power analysis, and
Geographic Area:	This proposed close-out stud Alaska Maritime National Wi Homer, Alaska.	y will be conducted at the ildlife Refuge headquarters in
Injured Resource/Service:	Common murres	

ABSTRACT

This proposed project is a close-out study for common murre population monitoring Project 01144, a previously approved study that will census the Chiswell Islands murre colonies during the upcoming FY 01 field season (see the EVOS fiscal year 2001 work plan) The close-out work will consist of analyzing the data collected during the FY 01 Chiswell Islands field work and comparing these results with previous postspill population counts, running a power analysis using these and other murre population count data (e.g., from the Barren Islands), and writing a final close-out report discussing the recovery status of murres at this injured nesting location and in the spill area.

INTRODUCTION

This proposed project is a close-out study for common murre population monitoring Project 01144, a previously approved study that will census the Chiswell Islands murre colonies during the upcoming FY 01 field season (see the EVOS fiscal year 2001 work plan) The close-out work will consist of analyzing the data collected during the FY 01 Chiswell Islands field work and comparing these results with previous postspill population counts, running a power analysis using these and other murre population count data (e.g., from the Barren Islands), and writing a final close-out report discussing the recovery status of murres at this injured nesting location and in the spill area.

NEED FOR THE PROJECT

A. Statement of Problem

The Chiswell Islands murre colonies were censused in 1989-1992 and 1998, and they will be censused again by previously approved Project 01144 during the upcoming 2001 field season. There will be a need to analyze the data collected during this work, compare the results with previous postspill counts, prepare a power analysis, and write a final close-out report discussing the recovery status of this injured population and common murres in the spill area.

B. Rationale/Link to Restoration

The Chiswell Islands murre colonies were censused in 1989-1992 and 1998, and they will be censused again by previously approved Project 01144 during the upcoming 2001 field season. There will be a need to analyze the data collected during this work, compare the results with previous postspill counts, prepare a power analysis, and write a final close-out report discussing the recovery status of this injured population and common murres in the spill area.

C. Location

The proposed FY 02 common murre close-out study will be conducted at the Alaska Maritime National Wildlife Refuge headquarters in Homer, Alaska.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

A large format, computer-generated color poster summarizing the close-out study results will be prepared and submitted to the Trustee Council for public display after data have been analyzed (similar posters showing results from common murre population monitoring studies 93049, 94039, 96144, 97144, and 99144 have been displayed at the Trustee Council January 1996-2000 restoration workshops). The printed posters are easy to transport and can be used by Trustee Council staff for a variety of purposes, including public displays at oil spill community meetings and schools. The posters and abstracts summarizing annual findings will also be available on-disk for inclusion in any on-line products that the Trustee Council may develop for public display. Copies of the poster will be sent to the Alaska SeaLife Center and the National Park Service Kenai Fjords Visitor Center in Seward, and one will be displayed at the AMNWR Visitor Center in Homer. Also, copies of the final close-out report will be available to the public in Homer and Anchorage. Study results will also be presented at public Trustee Council-sponsored meetings and workshops, and in scientific publications.

PROJECT DESIGN

A. Objectives

The project objectives are to analyze the data collected during the FY 01 Project 01144 Chiswell Islands common murre population monitoring work and compare the results with previous postspill counts, prepare a power analysis based on these counts, and write a final close-out report discussing the recovery status of this injured population and common murres in the spill area.

B. Methods

The project is designed to help test the null hypothesis that murre populations have not increased at nesting colonies in the spill area since the time of the event. The hypothesis will be tested by analyzing the Project 01144 population count data collected at the six Chiswell Islands nesting colonies during 2001 and statistically testing the updated postspill data set [i.e. FWS population counts made in 1989-1992, 1998, and 2001; and Dames & Moore (D&M) counts made in 1991] for differences among years and trends in population size (see Roseneau *et al.* 1999). Results will also be compared with 1989-1999 Barren Islands murre population numbers data to help determine the current recovery status of common murres in the spill area (see Roseneau *et al.* 2000).

Data Collection

No data collection is required. The data that will be analyzed and compared with previous postspill counts will be consist of the Project 01144 population census data collected at the six Chiswell Islands nesting colonies during the upcoming 2001 field season.

Data Analysis

Data will be analyzed by the same methods used during the 1998 Chiswell Islands and 1999 Barren Islands murre population monitoring studies (Projects 98144 and 99144; see Roseneau *et al.* 1999, 2000). To analyze the data, 1-day totals will be calculated for the 6-island nesting complex and then these scores will be averaged to obtain five- and six-island estimates. Results will be pooled with 1989-1992 and 1998 FWS and 1991 D&M scores (i.e., see Nysewander and Dipple 1990, 1991; Dipple and Nysewander 1992; Nysewander *et al.* 1993, Dragoo *et al.* 1995; Erikson 1995; Roseneau *et al.* 1999), and analyzed for trends and differences among years by running linear regressions and one-sample *t*-tests. The 0.1 significance level will be used to increase the power of the tests and reduce Type II error (the 0.9 confidence interval will be adequate for our purposes; see Roseneau *et al.* 1999 and 2000). The power analysis will be conducted using the latest version of the computer program MONITOR (new software by J.P.Gibbs).

C. Cooperating Agencies, Contracts and Other Agency Assistance

No contracts or other agency assistance are required for the study.

SCHEDULE

A. Measurable Project Tasks for FY 02 (1 October 2001 - 30 September 2002)

<u>FY 02</u>

1 Oct – 31 Dec 2001:	Review and analyze the Project 01144 Chiswell Islands murre
	population data, compare results with the 1989-1992 and 1998 FWS

	and 1991 D&M Chiswell Islands data, prepare an abstract and poster for the January 2002 EVOS work shop.
1 Jan 2002 – 15 Mar 2002:	Conduct a power analysis of the postspill Chiswell Islands common murre population census data, prepare a draft final close-out report and submit the draft for in-house review.
16 Mar - 10 Apr 2002:	Finalize the close-out report.
15 Apr 2002:	Submit the final close-out report to the Chief Scientist for peer review.
B . Project Milestones an	nd Endpoints
December 2001:	Complete data analysis, and a poster and abstract for the January 2002 EVOS work shop.
March 2002:	Complete a draft final report on the FY 01 Chiswell Islands field activities, and a power analysis of the postspill murre population data.

April 2002	Submit the final close-out re	port to the Chief Scientist.
<i>1</i> 1 1 1 1 1 1 1 1 1 1	Sublime the time close out ie	poir to the office beforenot.

C. Completion Date

A final close-out report will be submitted to the Chief Scientist on or before 15 April 2002.

PUBLICATIONS AND REPORTS

A final report on the 2001 Chiswell Islands common murre population monitoring study will be submitted to the Chief Scientist on or before 15 April 2002. Results of the study will also be included in the annual AMINWR seabird monitoring report, and reported in publications on northern Gulf of Alaska murre populations, as appropriate.

PROFESSIONAL CONFERENCES

Results from the 2001 Chiswell Islands common murre population monitoring study will be presented at the EVOS workshop in January 2002 (\$0.9K have been included in the budget to cover the costs of the principle investigator attending this meeting). Results will also be presented at the next Alaska Bird Conference in 2003 (travel expenses for this conference will be paid by AMNWR).

NORMAL AGENCY MANAGEMENT

The proposed work is not something that AMNWR or the FWS is required to do by statute or regulation. The Chiswell Islands are listed as an intermittent monitoring site for seabirds in the refuge's seabird monitoring program, and as such, these colonies are only censused opportunistically about once every 10 years. Also, because the islands are not part of the FWS's highest priority ecosystem, the Bering Sea, support for this type of work will probably not be available until overall FWS priorities change (i.e., from the Bering Sea to other officially designated ecosystems within Alaska). The proposed project is needed to analyze the Chiswell

Islands common murre population census data collected by Project 01144 during the upcoming FY 01 field season, compare these data with previous post spill murre population counts at these colonies, run a power analysis using the postspill census data, and write a final close-out report discussing the recovery status of this injured population and common murres in the spill area.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

The proposed close-out study will be coordinated with other AMNWR seabird monitoring work in the northern Gulf of Alaska. The refuge will donate up to one month of the project manager's time to the project, and will also supply office space and computers/printers for the study.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

This is a close-out project. No changes have been made to the analytical methods and schedules listed in the previously approved Common Murre Population Monitoring Project 01144 DPD, with the exception that a power analysis will be run on the Chiswell Island postspill population counts.

PROPOSED PRINCIPAL INVESTIGATOR

Name: David G. Roseneau Affiliation: Alaska Maritime National Wildlife Refuge Mailing address: 2355 Kachemak Bay Drive (Suite 101), Homer, Alaska 99603-8021 Phone number: (907) 235-6546 Fax number: (907) 235-7783 E-mail address: dave_roseneau@fws.gov

PRINCIPAL INVESTIGATOR

1. David G. Roseneau (Principal Investigator)

David Roseneau will be responsible for conducting the project. He will analyze and interpret data, prepare posters and presentations for scientific conferences and meetings, and write the final closeout report. Mr. Roseneau received his B.S. degree in wildlife management and M.S. degree in biology from the University of Alaska - Fairbanks in 1967 and 1972, respectively. His thesis research was on the numbers and distribution of gyrfalcons, *Falco rusticolus* on the Seward Peninsula, Alaska. He joined the U.S. Fish and Wildlife Service in January 1993 and was project leader of common murre restoration monitoring studies in the Barren Islands during 1993-1994 (Projects 93049 and 94039). Mr. Roseneau was also principal investigator of the 1995-1999 APEX Barren Islands seabird and large fish as samplers studies (Projects 95163J, 95163K, 96163J, 97163J, 97163K, 98163J, 98163K, 99163J, and 99163K), and the 1996-1997 and 1999 Barren Islands and 1998

Chiswell Islands common murre population monitoring studies (Projects 96144, 97144, 98144, and 99144). Currently, he is principal investigator of the 2000 APEX Barren Islands seabird and large fish as samplers studies (Projects 00163J and 00163K) and the 2000 Barren Islands common murre population monitoring project (Project 00144). Prior to 1993, Mr. Roseneau was a consulting biologist for over 20 years. During that time, he conducted and managed marine bird, raptor, and large mammal projects in Alaska and Canada for government agencies and private-sector clients, and he also participated in several large-scale murre (*Uria* spp.) population monitoring projects. In 1976-1983, as co-principal investigator of NOAA/OCSEAP Research Unit 460, he conducted monitoring studies of murres and black-legged kittiwakes (*Rissa tridactyla*) at

capes Lisburne, Lewis, and Thompson in the Chukchi Sea, and St. Lawrence, St. Matthew, and Hall islands in the Bering Sea. He also studied auklets (Aethia spp.) at St. Lawrence and St. Matthew islands, and participated in murre and kittiwake projects at Bluff in Norton Sound. During 1984-1986, he also participated in monitoring studies of murres and kittiwakes in the northeastern Chukchi Sea, and in 1987-1988, 1991-1992, and 1995-1999, he conducted additional murre and kittiwake monitoring work at capes Lisburne and Thompson, and Chamisso and Puffin islands. Mr. Roseneau is experienced in collecting and analyzing data on numbers, productivity, and food habits of seabirds; relating trends in numbers and productivity to changes in food webs and environmental parameters (e.g., air and sea temperatures, current patterns); and assessing potential impacts of petroleum exploration and development on nesting and foraging marine birds. He has broad knowledge of rock climbing techniques and has operated inflatable rafts and other outboard-powered boats in the Bering, Chukchi, and Beaufort seas and on various Alaskan rivers in excess of 3,000 hrs. He has also accrued several hundred additional hours operating time in small boats and larger, more powerful vessels (e.g. 25 ft, 300-400 hp HydroSports and Boston Whalers) in Kachemak Bay, Prince William Sound, and Kenai Peninsula and Barren Island waters. During his career, Mr. Roseneau has authored and co-authored 100 reports and publications, including 33 on Alaskan seabirds and 5 on a new sampling technique for capelin and sand lance. He has also made over 30 public presentations on seabirds, raptors, and caribou at scientific and wildlife law enforcement conferences and meetings.

Selected Seabird Publications

- Murphy, E.C., A.M. Springer, and D.G. Roseneau. 1991. High annual variability in reproductive success of kittiwakes (*Rissa tridactyla* L.) at a colony in western Alaska. J. Anim. Ecol. 60: 515-534.
- Springer, A.M., E.C. Murphy, D.G. Roseneau, C.P. McRoy, and B.A. Cooper. 1987. Paradox of pelagic food webs in the northern Bering Sea I. Seabird food habits. Cont. Shelf Res. 7: 895-911.
- Murphy, E.C., A.M. Springer, and D.G. Roseneau. 1986. Population status of *Uria aalge* at a colony in western Alaska: results and simulations. Ibis 128: 348-363.
- Springer, A.M., D.G. Roseneau, D.S. Lloyd, C.P. McRoy, and E.C. Murphy. 1986. Seabird responses to fluctuating prey availability in the eastern Bering Sea. Marine Ecol. Prog. Ser. 32: 1-12.
- Springer, A.M. and D.G. Roseneau. 1985. Copepod-based food webs: auklets and oceanography in the Bering Sea. Marine Ecol. Prog. Ser. 21: 229-237.
- Murphy, E.C., D.G. Roseneau, and P.J. Bente. 1984. An inland nest record for the Kittlitz's murrelet. Condor 86: 218.
- Springer, A.M., D.G. Roseneau, E.C. Murphy, and M.I. Springer. 1984. Environmental controls of marine food webs: food habits of seabirds in the eastern Chukchi Sea. Can. J. Fish Aquat. Sci. 41: 1202-1215.

OTHER KEY PERSONNEL

1. G. Vernon Byrd (Project Manager)

Vernon Byrd will supply overall guidance to the project, including providing advice during data analysis and report writing. He will also review reports and presentations as needed, and help prepare manuscripts for publication. Mr. Byrd received his B.S. degree in wildlife management from the University of Georgia in 1968, did post-graduate studies in wildlife biology at the University of Alaska-Fairbanks in 1975, and completed a M.S. degree in wildlife resources management at the University of Idaho in 1989. His thesis, entitled "Seabirds in the Pribilof Islands, Alaska: Trends and monitoring methods", explored statistical procedures for analyzing

kittiwake (Rissa spp.) and murre (Uria spp.) population data. Mr. Byrd has worked for the U.S. Fish and Wildlife Service for over 20 years, focusing on studies of marine birds in Alaska and Hawaii. His major interests center around monitoring long-term trends in seabird populations, including numbers of birds and reproductive performance, and he has worked at murre colonies in the Aleutian Islands, the Bering and Chukchi seas, and western Gulf of Alaska. Mr. Byrd was a co-author of the final T/V Exxon Valdez oil spill damage assessment report for murres. Also, he was project manager of the 1993-1994 Barren Islands common murre restoration monitoring projects (Projects 93049 and 94039), the 1995-1999 APEX Barren Islands seabird and large fish as samplers studies (Projects 95163J, 95163K, 96163J, 97163J, 97163K, 98163J, 98163K, 99163J, and 99163K), the 1996-1997 and 1999 Barren Islands and 1998 Chiswell Islands common murre population monitoring projects (Project 96144, 97144, and 98144), and EVOSsponsored work designed to remove predators from seabird nesting habitats (Projects 94041 and 95041). Currently, Mr. Byrd is project manager of the 2000 APEX Barren Islands seabird and large fish as samplers studies (Projects 00163J and 00163K) and the 2000 Barren Islands common murre population monitoring project (Project 00144). He has authored and co-authored over 50 scientific papers and 75 U.S. Fish and Wildlife Service reports on field studies, and has made over 35 presentations on seabirds at scientific conferences and meetings. Mr. Byrd is the supervisory wildlife biologist at the Alaska Maritime National Wildlife Refuge, the premier seabird nesting area in the national public land system.

Selected Seabird Publications

5. 1

- Byrd, G.V., E.C. Murphy, G.W. Kaiser, A.J. Kondratyev, and Y.V. Shibaev. (In press). Status and ecology of offshore fish-feeding alcids (murres and puffins) in the North Pacific Ocean. Proceedings of "Symposium on the Status, Ecology, and Conservation of Marine Birds of the Temperate North Pacific". Canadian Wildlife Service, Ottawa.
- Byrd, G.V., and J.C. Williams. Whiskered Auklet. 1993. A chapter describing the biology of the species *in* The birds of North America, No. 76 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia PA, and the American Ornithologists' Union, Washington, D.C. 12 pp.
- Byrd, G.V., and J.C. Williams. Red-legged Kittiwake. 1993. A chapter describing the biology of the species *in* The birds of North America No. 60 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia PA, and the American Ornithologists' Union, Washington, D.C. 12 pp.
- Springer, A.M. and G.V. Byrd. 1989. Seabird dependence on walleye pollock in the southeastern Bering Sea. Pages 667-677 *in* Proceedings of the International Symposium on the Biology and Management of Walleye Pollock. Alaska Sea Grant Rep. No. 89-1, Univ. of Alaska-Fairbanks.

LITERATURE CITED

- Dipple, C. and D. Nysewander. 1992. Marine bird and mammal censuses in the Barren Islands, 1989 and 1990, with specific emphasis on species potentially impacted by the 1989 *Exxon Valdez*, including supplemental appendices for 1991 murre data. Unpubl. rept., U. S. Fish Wildl. Serv., Homer, Alaska.
- Dragoo, D.E., G.V. Byrd, D.G. Roseneau, D.A. Dewhurst, J.A. Cooper, and J.H. McCarthy. 1995. Effects of the *T/V Exxon Valdez* oil spill on murres: A perspective from observations at breeding colonies four years after the spill. Final rept., Restoration Proj. No. 11, U.S. Fish Wildl. Serv., Homer, Alaska.

- Erikson, D.E. 1995. Surveys of murre colony attendance in the northern Gulf of Alaska following the *Exxon Valdez* oil spill. Pp. 780-819 *in Exxon Valdez* oil spill: Fate and effects in Alaskan waters, ASTM STP 1219, P.G. Wells, J.N. Butler, and J.S. Hughes (eds.), Amer. Soc. for Testing and Materials, Philadelphia, Pennsylvania.
- Nysewander, D. and C. Dipple. 1990. Population surveys of seabird nesting colonies in Prince William Sound, the outside coast of the Kenai Peninsula, Barren Islands, and other nearby colonies, with emphasis on changes in numbers and reproduction of murres. Bird Study No.
 3. Unpubl. prog. rept., U.S. Fish Wildl. Serv., Homer, Alaska.
 - _____ and _____. 1991. Population surveys of seabird nesting colonies in Prince William Sound, the outside coast of the Kenai Peninsula, Barren Islands, and other nearby colonies, with emphasis on changes of numbers and reproduction of murres. Bird Study No. 3. Unpubl. prog. rept., U. S. Fish Wildl. Serv., Homer, Alaska.
 - _____, C.H. Dipple, G.V. Byrd, and E.P. Knudtson. 1993. Effects of the *T/V Exxon Valdez* oil spill on murres: A perspective from observations at breeding colonies. Bird Study No. 3. Final rept., U.S. Fish Wildl. Serv., Homer, Alaska.
- Roseneau, D.G., A.B. Kettle, and G.V. Byrd. 1999. Common murre restoration monitoring in the Chiswell Islands, Alaska, 1998. Unpubl. annual rept. by the Alaska Maritime National Wildlife Refuge, Homer, Alaska for the *Exxon Valdez* Oil Spill Trustee Council, Anchorage, AK (Restoration Project 98144).
 - ____. 2000. Common murre restoration monitoring in the Barren Islands, Alaska, 1999. Unpubl. annual rept. by the Alaska Maritime National Wildlife Refuge, Homer, Alaska for the *Exxon Valdez* Oil Spill Trustee Council, Anchorage, AK (Restoration Project 99144).

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2002 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2001 - September 30, 2002

Budget Category:	Authorized FFY 2001	Proposed FFY 2002						
Personnel	\$14.6	\$11.6						
Travel	\$1.2	\$0.9						
Contractual	\$24.0	\$0.0						
Commodities	\$1.8	\$0.6						
Equipment	\$1.0	\$0.0		LONG R	ANGE FUNDIN	IG REQUIREM	ENTS	
Subtotal	\$42.6	\$13.1	Estimated Estimated Estimated Estimated Estimated				Estimated	
General Administration	\$3.9	\$1.7	FFY 2003	FFY 2004	FFY 2005	FFY 2006	FFY 2007	FFY 2008
Project Total	\$46.5	\$14.8	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Full-time Equivalents (FTE)	0.4	0.2						
			Dollar amounts are shown in thousands of dollars.					
Other Resources								
Comments: This project is a close-out study. The proposed budget covers the costs of analyzing the data collected by Common Murre Population Monitoring Project 01144 at the Chiswell Islands murre colonies in 2001, comparing the results with previous postspill counts, running a power analysis on these and other murre population count data (e.g., Barren Islands), and writing a final close-out report disscussing the recovery status of this injured population and common murres in the spill area. Travel costs to attend the 2002 EVOS workshop in Anchorage are included in the proposed FFY 2002 budget. The Alaska Maritime National Wildlife Refuge will donate 1 month of the project manager's time to the project. The refuge will also provide computers and office space for the study.								

FY02

Project Number: 02144 Project Title: Common Murre Population Monitoring Agency: DOI-FWS



Prepared: 04/2/01

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2002 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2001 - September 30, 2002

Personnel Costs:	GS/Range/	Months	Monthly		Proposed	
Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 2002
David G. Roseneau	Project Leader (Principal Investigator)	GS11/6	2.0	5.8	0.0	11.6
G. Vernon Byrd	Project Manager	GS13/1	1.0	0.0	0.0	0.0
C. Berg	Program Manager	GS12	0.5	0.0	0.0	0.0
	Subtotal	1. (1. Carlor and a starting of the starting	35	5.8	0.0	
				Pe	rsonnel Total	\$11.6
Travel Costs:		Ticket	Round	Total	Daily	Proposed
Description		Price	Trips	Days	Per Diem	FFY 2002
					_	
Travel to the EVOS workshop in A	nchorage in January 2002	0.3	1	3	0.2	0.9
		ĺ				
		·	I		Travel Total	\$0.9
				1		

 FY02
 Project Number: 02144
 FORM 3B

 Project Title: Common Murre Population Monitoring
 & Travel

 Agency: DOI-FWS
 DETAIL

2 of 4

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2002 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2001 - September 30, 2002

Contractual Costs			Proposed
Description			FFY 2002
			1
1			
	·		
1			
When a non-trustee organizatio	on is used, the form 4A is required.	Contractual Tota	1 <u>\$0.0</u>
Commodities Costs:		· · · · · · · · · · · · · · · · · · ·	FEV 2002
			1112002
Costs of producing & printing 4	large laminated format posters for public display of project results (1 each f	for the Trustee Council, Alaska	0.6
Sealife Center, National Park	Service Kenal Fjords Visitor Center, and AMINWR Visitor Center).		
[Note: FWS will furnish of	fice materials and computers.]		
		Commodities Total	\$0.6
L			\
[]			FORM 3B
	Project Number: 02144		ontractual &
FY02	Project Title: CommonMurre Population Monitoring		ommodities
	Agency: DOI-FWS		DETAIL
Prepared: 04/2/01		L	
3 of 4			6/12/97

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2002 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2001 - September 30, 2002

New Equi	pment Purchases:	Number	Unit	Proposed
Descriptio	n	of Units	Price	FFY 2002
No e	quipment is needed for the project			\$0.0
Those pur	chases associated with replacement equipment should be indicated by placement of an R.	New Ea	uipment Total	\$0.0
Existing I	Equipment Usage:		Number	Inventory
Descriptio	n		of Units	Agency
Computer	s and printers (non oil spill equipment)		2	FWS
FY	02 Project Number: 02144 Project Title: Common Murre Population Monitoring Agency: DOI-FWS		F	FORM 3B Equipment DETAIL
Prepared:	04/2/01			

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02159

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Project Title: Surveys to Monitor Marine Bird Abundance in Prince William Sound during Winter and Summer 2002

Project Number: Restoration Category: Proposer: Lead Trustee Agency: Cooperating Agencies: Alaska SeaLife Center: Duration: Cost FY 02: Cost FY 03: Cost FY 04: Geographic Area: Injured Resource/Service: 02159 Monitoring Migratory Bird Management, U. S. Fish and Wildlife Service U. S. Department of the Interior, Fish and Wildlife Service None

Every other year until recovered \$~ 194.1 \$~ 25.0 \$~ 146.0 Prince William Sound Marine Birds and Sea Otters



ABSTRACT

We propose to conduct small boat surveys to monitor abundance of marine birds and sea otters (Enhydra lutris) in Prince William Sound, Alaska during March and July 2002. Seven previous surveys have monitored population trends for >65 bird and 8 marine mammal species in Prince William Sound. We will use data collected in 2002 to examine trends from summer 1989-2002 and from winter 1990-2002 by determining whether populations in the oiled zone changed at the same rate as those in the unoiled zone. We will also examine overall population trends for the Sound from 1989-2002. Due to the lack of data prior to the Exxon Valdez oil spill, continued monitoring of marine birds and sea otters is needed to determine whether populations injured by the spill are recovering. Data collected in 2000 indicated that bald eagles (Haliaeetus *leucocephalus*) are increasing in winter and summer throughout Prince William Sound, harlequin ducks (*Histrionicus histrionicus*) are increasing in the oiled area in winter, and black oystercatchers are increasing throughout Prince William Sound in summer. Numbers of all other injured species are either not changing or are declining in the oiled area. Common loons (Gavia immer), cormorants (Phalacrocorax spp.), and common murres (Uria aalgae) are showing no trend in the oiled area; pigeon guillemots (Cepphus columba) and marbled murrelets (Brachyramphus marmoratus) are declining in the oiled areas of Prince William Sound and Kittlitz's Murrelet (Brachyramphus brevirostris) is declining throughout Prince William Sound. Results of these surveys up through 1998 have been published by Irons et al. (2000) and Lance et al. 2001). Analyses of these survey data are the only ongoing means to evaluate the recovery of most of these injured species.

INTRODUCTION

The waters and shorelines of Prince William Sound support abundant marine bird and sea otter populations throughout the year (Isleib and Kessel 1973, Hogan and Murk 1982, Irons et al. 1988a). Potential injuries to marine birds from exposure to the T/V Exxon Valdez oil spill included, but were not limited to, death, changes in behavior, and decreased productivity. U.S. Fish and Wildlife Service, Migratory Bird Management conducted boat surveys in Prince William Sound prior to the Exxon Valdez oil spill in 1972-73 (Dwyer et al. 1976) and 1984-85 (Irons et al. 1988a,b). After the oil spill, Natural Resource Damage Assessment Bird Study Number 2 (Burn 1994, Klosiewski and Laing 1994) was initiated to document damage from the oil spill on the marine bird and sea otter populations of Prince William Sound. Data from these surveys indicated that populations of sea otters (Burn 1994) and several marine bird species (Klosiewski and Laing 1994) declined in the oil spill area. Thus, restoration projects 93045 (Agler et al. 1994a), 94159 (Agler et al. 1995a), 96159 (Agler and Kendall 1997), 98159 (Lance et al. 1999), and 00159 (Stephensen et al. 2001) were initiated to continue monitoring marine bird and sea otter population abundance to assess recovery of injured species. Restoration projects 93045, 94159, 96159, 98159, and 00159 continued the original Exxon Valdez oil spill damage assessment study (Bird Study Number 2, Burn 1994, Klosiewski and Laing 1994) from 1989-91.

Using small boat surveys, this project will collect additional information to monitor the distribution and abundance of marine birds and sea otters in Prince William Sound. These data will be combined with data collected in 1989-91 (Klosiewski and Laing 1994), 1993 (Agler et al. 1994a), 1994 (Agler et al. 1995a), 1996 (Agler and Kendall 1997), 1998 (Lance et al. 1999, Irons et al. 2000, Lance et al. 2001) and 2000 (Stephensen et al. 2001) to examine trends in marine bird and sea otter distribution and abundance. This project will benefit restoration of Prince William Sound by determining whether populations that declined due to the spill are recovering and by identifying what species are still of concern.

NEED FOR THE PROJECT

A. Statement of the Problem

Almost 30,000 marine bird (Piatt et al. 1990) and 900 sea otter (DeGange and Lensink 1990) carcasses were recovered following the *Exxon Valdez* oil spill. Based on modeling studies using carcass search effort and population data, an estimated 250,000 marine birds were killed in Prince William Sound and the northern Gulf of Alaska (Piatt and Ford 1996). Garrott et al. (1993) estimated that 2,800 sea otters also were killed. These estimates are probably low, because they only include direct mortality occurring in the first five months after the spill.

The U. S. Fish and Wildlife Service conducted boat surveys of marine bird and sea otter populations in Prince William Sound in 1972-73 (Dwyer et al. 1976), 1984-85 (Irons et al. 1988b), and several years following the spill (1989, 1990, 1991, Klosiewski and Laing 1994; 1993, Agler et al. 1994a; 1994, Agler et al., 1995a; 1996, Agler and Kendall, 1997; 1998, Lance

et al., 1999; and 2000, Stephensen et al. 2001). Klosiewski and Laing (1994) documented overall declines in 15 species or species groups between 1972-73 (Dwyer et al. 1976) and the years after the spill. When comparing population estimates with 1984-85 data, Klosiewski and Laing (1994) documented decline of 6 species or species groups.

Burn (1994), using data from the boat surveys, documented declines in sea otter abundance in shoreline habitats of Prince William Sound following the spill. Burn (1994) detected a continuing pattern of significantly lower sea otter densities in oiled coastal areas, suggesting mortality in or displacement of sea otters from these areas.

Stephensen et al. (2001) examined whether marine bird and mammal species designated as injured by the *EVOS* trustee council had shown signs of recovery by 2000. Data collected from 1989 to 2000 indicated that bald eagles (*Haliaeetus leucocephalus*) are increasing in winter and summer throughout Prince William Sound, harlequin ducks (*Histrionicus histrionicus*) are increasing in the oiled area in winter, and black oystercatchers are increasing throughout Prince William Sound in summer. Numbers of all other injured species are either not changing or are declining in the oiled area. Common loons (*Gavia immer*), cormorants (*Phalacrocorax spp.*), and common murres (*Uria aalgae*) are showing no trend in the oiled area; pigeon guillemots (*Cepphus columba*) and marbled murrelets (*Brachyramphus marmoratus*) are declining in the oiled areas of Prince William Sound and Kittlitz's Murrelet (*Brachyramphus brevirostris*) is declining throughout Prince William Sound. Analyses of these survey data are the only ongoing means to evaluate the recovery of most of these injured species.

B. Rationale/Link to Restoration

Restoration of marine bird and sea otter populations requires population estimates to determine whether recovery is occurring or if species are still affected by the oil spill. This project will benefit marine birds and sea otters by revealing species that show continuing injury due to the *T/V Exxon Valdez* oil spill. Agler et al. (1994a, 1995a), Agler and Kendall (1997), and Lance et al. (1999), and Stephensen et al. (2001) found additional populations that were not previously shown to be injured. Survey data from this project have also been used by investigators of other studies on pigeon guillemots (Greg Golet, pers. comm.), marbled murrelets (K. Kuletz, pers. comm.), Kittlitz's murrelets (B. Day, per comm.), harlequin ducks (D. Rosenberg and D. Esler, pers. comm.), birds and forage fish (W. Ostrand, pers. comm.), herring (E. Brown, pers. comm.), and sea otters (Burn 1994).

This project relates to the restoration objectives of several species. The *Exxon Valdez Oil Spill Restoration Plan (Exxon Valdez Oil Spill Trustee Council 1994)* lists each species' restoration objectives separately, and we have only included objectives relating to this project:

Cormorants - "will have recovered when their populations return to pre-spill levels in the oil-spill area. An increasing population trend in Prince William Sound will indicate that recovery is underway."

Harlequin duck - "will have recovered when breeding and post-breeding season densities and production of young have returned to estimated pre-spill levels, or when there are no differences in these parameters between oiled and unoiled areas."

Bald eagle -"will have recovered when their population and productivity return to prespill levels."

Black oystercatchers - "will have recovered when populations attain pre-spill levels"

Marbled murrelet - "will have recovered when population trends are increasing."

Pigeon guillemot - "will have recovered when populations are stable or increasing."

Sea otter - "will be considered recovered when population abundance and distribution are comparable to pre-spill abundance and distribution"

All of the above recovery objectives relate to determining the population abundance of injured species. This is critical to determining recovery for most species. Common loons and Kittlitz's murrelets were also designated as injured species, but no recovery objective has been developed due to lack of information on their populations. We propose to sample the entirety of Prince William Sound during March and July 2002 to estimate population abundance and distribution of marine birds and sea otters. Data will be comparable with pre- and post-spill data collected by the U. S. Fish and Wildlife Service (Dwyer et al. 1976, Irons et al. 1988a,b, Agler et al. 1994a, Klosiewski and Laing 1994, Agler et al. 1995a, Agler and Kendall 1997, Lance et al. 1999, and Stephensen et al. 2001) and can be used to examine trends in abundance for these species. There are currently no other studies monitoring the populations of loons, cormorants, and black oystercatchers, harlequin ducks, murres, pigeon guillemot, marbled murrelets, or Kittlitz''s murrelets in Prince William Sound.

Additionally, Klosiewski and Laing (1994) found evidence of oil spill damage for scoters (*Melanitta* spp.), mew gull (*Larus canus*), arctic tern (*Sterna paradisaea*), and northwestern crow (*Corvus caurinus*). These species have never been added to the list of injured species and do not have restoration objectives. At the present time, this proposed study is the only study continuing to consider these species and track their populations.

By using data from previous surveys we have conducted power analyses to examine the power to detect trends in population abundance (Taylor and Gerrodette 1993). If all other parameters are equal, power is determined by the number of surveys conducted in a given period of time. As the number of surveys increases the ability to detect a trend increases. For example if a population had a coefficient of variation (C.V.) of 0.30 (this is higher than that of 73% of the injured species; Agler and Kendall 1999) the ability to detect an average annual 10 % change in population is 40% with 6 surveys (Fig. 1). By conducting surveys in 2002 the number of surveys increases to and the power to detect same population change increases to \sim 71% (Fig. 1). If we continue biannual surveys, when we have completed 10 surveys the power to detect this change would be 90% (Fig 1). Thus we feel it is important to continue these surveys to enable us to

increase the ability to detect population trends.

C. Location

This study will be conducted in Prince William Sound. The study area includes all water within Prince William Sound, as well as land within 100 m of the shore.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

We would be happy to provide informational meetings in communities within Prince William Sound, as permitted by our survey schedule. We will use a charter vessel(s) from communities within the Sound or adjacent regions (Homer or Seward).

PROJECT DESIGN

A. Objectives

The purpose of this study is to obtain population estimates of marine birds and sea otters in Prince William Sound to monitor the recovery of species whose populations may have declined due to the T/V Exxon Valdez oil spill and to determine whether additional species may still be affected by the oil spill. The specific objectives of this project include:

- 1. To determine distribution and estimate population abundance, with 95% confidence limits, of marine bird and sea otter populations in Prince William Sound during March and July 2002;
- 2. To determine whether the marine bird species whose populations declined more in oiled areas than in non-oiled areas of Prince William Sound have recovered;
- 3. To determine whether additional species show any oil spill effects;
- 4. To support restoration studies on harlequin duck, black oystercatcher, pigeon guillemot, marbled murrelet, Kittlitz's murrelet, sea ducks, and sea otter by providing data on population changes, distribution, and habitat use of Prince William Sound populations.

B. Methods

1. Study Area

Our study area includes all waters within Prince William Sound and all land within 100 m of shore (Fig. 2). We exclude Orca Inlet, near Cordova, Alaska and the southern sides of Montague, Hinchinbrook, and Hawkins Islands (Klosiewski and Laing 1994).

2. Sampling Methods

Survey methodology and design will remain identical to that of post-spill surveys conducted by the U. S. Fish and Wildlife Service in 1989, 1990, 1991, (Klosiewski and Laing 1994), March and July 1993 (Agler et al. 1994a), March 1994 (Agler et al. 1995a), March and July 1996 (Agler and Kendall 1997), March and July 1998 (Lance et al. 1999), and March and July 2000 (Stephensen et al. 2001). We will conduct two surveys: one during March and another during July 2002. We will use three 7.7 m fiberglass boats traveling at speeds of 10-20 km/hr to survey transects over two 3-week periods. For each survey, two observers will survey a sampling window 100 m on either side, ahead of, and above the vessel (Klosiewski and Laing 1994). When surveying shoreline transects, observers will also record sightings on land within 100 m of shore. Observers will sample continuously and use binoculars to aid in species identification. Observers will practice estimating distances with a duck decoy, and radars on the survey vessels will be used to assist in determining our distance from land on shoreline transects. We will survey most transects when wave height is <30 cm, and we will not survey when wave height is <60 cm.

We will continue to use a stratified random sampling design containing three strata: shoreline, coastal-pelagic, and pelagic (Klosiewski and Laing 1994). The shoreline stratum will consist of waters within 200 m of land. Irons et al. (1988b) divided this stratum, by habitat, into 742 transects with a total area of 820.74 km². We will locate shoreline transects by geographic features, such as points of land, to facilitate orientation in the field and to separate the shoreline by habitat (Irons et al. 1988a,b). Shoreline transects will vary in size, ranging from small islands with <1 km of coastline to sections of the mainland with over 30 km of coastline. Mean transect length will be 5.55 km. During winter, we plan to survey 99 shoreline transects, but this number varies among years, due to weather conditions and ice blockage. During summer, we plan to survey 212 shoreline transects. All transects were randomly chosen, and the same transects are used each survey (Klosiewski and Laing 1994).

To sample the coastal-pelagic and pelagic strata of Prince William Sound, we will divide the study area into 5-minute latitude-longitude blocks. When a block includes >1.8 km of shoreline, we will classify it in the coastal-pelagic stratum, and we will classify blocks with \leq 1.8 km of shoreline in the pelagic stratum (Klosiewski and Laing 1994). When coastal-pelagic or pelagic blocks intersect the 200 m shoreline stratum, they will be truncated to avoid overlap. We plan to survey 2 north-south transect lines, 200 m wide each, located 1 minute inside the east and west boundaries of each coastal-pelagic and pelagic block. We will use Global Positioning Systems and nautical compasses to navigate transect lines. In the coastal-pelagic stratum, we plan to survey \leq 29 blocks in the winter and \leq 46 blocks in the summer. In the pelagic stratum, we plan to survey \leq 25 blocks during both seasons.

3. Poststratification by Oiling

To examine population trends over time and to determine if populations injured by the spill are recovering, we will poststratify Prince William Sound into two zones, oiled and unoiled, based upon the pattern of oiling by the *Exxon Valdez* oil spill (Klosiewski and Laing 1994).

4. Statistical Analyses

As in previous surveys (Klosiewski and Laing 1994, Agler et al. 1994a,b,c, 1995a,b, Agler and Kendall 1997, Lance et al. 1999, Stephensen et al. 2001), we will use a ratio estimator (Cochran 1977) to estimate population abundance. Shoreline transects will be treated as a simple random sample; whereas, the coastal-pelagic and pelagic transects will be analyzed as two-stage cluster samples of unequal size (Cochran 1977). To do this, we will estimate the density of birds counted on the combined transects for a block and multiply by the area of the sampled block to obtain a population estimate for each block. We then will add the estimates from all blocks surveyed and divide by the sum of the areas of all blocks surveyed. We will calculate the population estimates for each species and for all birds in Prince William Sound will be calculated by adding the estimates from the three strata, and we will calculate 95% confidence intervals for these estimates from the sum of the variances of each stratum (Klosiewski and Laing 1994).

Population estimates for each species will be combined with other post-oil spill population estimates to determine population trends. We plan to use a homogeneity of slopes test (Freud and Littell 1981) to compare population trends between the oiled and unoiled zones of Prince William Sound to examine whether species with population estimates of >500 individuals have changed over time. To do this, we must assume that marine bird and sea otter populations increase at the same rate in the oiled and unoiled zones of Prince William Sound. The log₁₀ of each population estimate will be calculated after adding 0.5 to the estimate to prevent effects from using log 0. Significantly different slopes would indicate that population abundance of a species or species group changed at different rates. For species or species groups showing a significant difference in slopes or ratios, we will determine the rate of change in each zone by linear regression analyses.

5. Statistical Justification for Proposed Monitoring Schedule

Currently, these surveys are scheduled to occur every 2 years over an unspecified time period. This schedule should be considered in light of the results of a power analysis.

To determine optimum survey frequency, we conducted a power analysis to estimate the probability of detecting trends in abundance using linear regression from a given number of samples (Taylor and Gerrodette 1993). We examined our power to detect trends when coefficient of variation (CV) of the population was 0.30 (greater than the mean CV from previous surveys for 73% of the injured species; Fig. 1) and when the CV = 0.13 (the mean summer CV for *Brachyramphus* murrelets, an injured species; Fig. 3). Models of seabird population growth predict most species increase no more than 12% per year (Nur and Ainley 1992), so we used 10% for our comparisons.

With CV=0.30 the probability of detecting an average annual change of 10% would be 55% with the 7 surveys completed to date (Fig 1). The probability would increase to ~ 71% in 2002 (8 surveys). If 10 surveys were completed the probability would be 92%. For murrelets the power

to detect a 10% change is now 95% (Fig. 3). This would increase to 100% with the completion of the 2002 surveys (Fig. 3).

Based on these calculations, we recommend a monitoring schedule of every two years for these surveys.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

This project includes two contracts for a vessel to provided logistical support. We will need a vessel large enough to provide lodging and meals for 9 people and carry fuel for the small boats. During the winter survey, we will need a support vessel for 10 days. During the summer survey we can reduce our need for a support vessel to 7 days as we can use field camps in Prince William Sound for logistical support.

SCHEDULE

A. Measurable Project Tasks for FY 02 (October 1, 2001-September 30, 2002)

October-January:	Arrange logistics for surveys, train personnel
February:	Final preparations for survey
March:	Conduct winter survey in Prince William Sound
April-May:	Return to Anchorage, enter and analyze data, and store equipment
June:	Hire and train personnel, arrange logistics for summer survey
July:	Conduct summer survey in Prince William Sound
August:	Return to Anchorage, enter and analyze data, and store equipment
September:	Continue analysis of data from surveys

B. Project Milestones and Endpoints

After each set of surveys, we will examine the data for differences in trends between the oiled and unoiled zone for all designated injured marine birds and sea otters.

C. Completion Date

This project will continue biannually until population trends for the injured species show recovery from injury.

PUBLICATIONS AND REPORTS

October 2002: January 15, 2003: April 15, 2003: Prepare draft report of 2000 surveys Draft Report to Peer Review Final Report complete

PROFESSIONAL CONFERENCES

No funds are requested for attending meetings.

NORMAL AGENCY MANAGEMENT

This project is not a part of normal agency management for the U. S. Fish and Wildlife Service in Alaska. Although considered an important ecosystem within Alaska, surveys of Prince William Sound would not be as high a priority as funding for projects within other areas of the state.

This year, Migratory Bird Management, U. S. Fish and Wildlife Service plans to provide 2 permanent personnel during the March and July surveys to help reduce costs.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

Principle investigators from other EVOS trustee council funded projects have used our survey data in the past. Data from these surveys would be helpful for the sea otter, harlequin duck, and pigeon guillemot portions of the nearshore vertebrate predator project (\025); the black-legged kittiwake, marbled murrelet (/231), and seabird foraging portions of the Alaska predator ecosystem experiment (\163); and harbor seal monitoring (\064).

EXPLANATION OF CHANGES TO CONTINUING PROJECTS

The 2002 surveys will be identical to previous Prince William Sound Surveys.

PROPOSED PRINCIPAL INVESTIGATORS

Unknown

and

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PROPOSED PRINCIPLE INVESTIGATORS

1. Co-Project Leader - Unknown.

2. Co-Project Leader - David B. Irons, Ph.D., Wildlife Biologist, GS-12.

Dr. David Irons received his PhD from the University of California, Irvine in 1992. His dissertation was on the foraging ecology and breeding biology of the black-legged kittiwake in Prince William Sound. He received his M.S. from Oregon State University in 1982 where he studied foraging behavior of glaucous-winged gulls in relation to the presence of sea otters. Dr. Irons conducted marine birds and sea otter surveys in Prince William Sound in 1984 and 1985. He has been studying kittiwakes in Prince William Sound for 17 years and completed the *Exxon Valdez* oil spill kittiwake damage assessment study. Dr. Irons has overseen several seabird studies in the past few years, including marine bird and sea otter surveys of Prince William Sound and Cook Inlet, a seabird monitoring study on Little Diomede Island, and a cost of reproduction study on kittiwakes.

Selected Seabird Publications:

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- Agler, B. A., S. J. Kendall, P. E. Seiser, and D. B. Irons. 1994b. Population estimates of marine bird and sea otter populations in Lower Cook Inlet, Alaska during June 1993. Unpubl. Rep., U. S. Fish and Wildl. Serv., Anchorage, Alas. 73 pp. + appendices.
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Figure 1. Estimated power (probability of detection) based on number of surveys conducted to detect a trend of marine bird and sea otter populations in Prince William Sound when CV = 0.30.



Figure 2. Transects and blocks surveyed during July small boat surveys of Prince William Sound. Transects were classified into 3 strata; the shoreline stratum, (<200 m from land), the coastal-pelagic stratum (lighter shaded blocks), and the pelagic stratum (darker shaded blocks).



Figure 3. Estimated power (probability of detection) based on numbers of surveys conducted to detect a trend in the July *Brachyramphus* murrelet population in Prince William Sound. The CV = 0.13.

2002 EXXON VALDEZ TRUS

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COUNCIL PROJECT BUDGET

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October 1, 2001 - September 30, 2002

	Authorized	Proposed						
Budget Category:	FFY 2001	FFY 2002						
Demonst	<u>017</u>							
Traval	\$21.7	\$93.3						
Contractual		\$10.8 \$46.5						
Commodities		\$40.0						
Equipment	\$0.0	Ψ <u>2</u> 4.7					MENITO	
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Project Total	φ25.0	φ194.1	\$23.0	φ140.U	φ20.0	المرتبع واستنبعت والمتناكر		
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2002 EXXON VALDEZ TRUS

COUNCIL PROJECT BUDGET

Per	sonnel Costs:		GS/Range/	Months	Monthly		Proposed	
PM	Name	Position Description	Step	Budgeted	Costs	Overtime	FFY 1996	
	Unknown	Co-Project Leader	GS11-1	9.0	5,365		48.3	
	Unknown	Technician	GS5 - 1	3.0	2,500		7.5	
	Unknown	Technician	GS5 - 1	3.0	2,500		7.5	
	Unknown	Technician	GS5 - 1	3.0	2,500		7.5	
	Unknown	Technician	GS5 - 1	3.0	2,500		7.5	
	Unknown	Technician	GS5 - 1	3.0	2,500		7.5	
	Unknown	Technician	GS5 - 1	3.0	2,500		7.5	
 								
<u> </u>	Subtota			27.0	20,365	0		
Ino	Those costs associated with program management should be indicated by			an *.	Pei	rsonnel Total	\$93.3	
Tra	Travel Costs:			Round	Total	Daily	Proposed	
PM	Description		Price	Trips	Days	Per Diem	FFY 1996	
	I ruck and boat on train Por	tage - Whittier	40	8			0.3	
	Per diem, (camp rate), 9 pe	opie, 20 a winter; 9 people 20 a summer			360	3	1.1	
	Per diem, (travel rate), 9 pe	opie, 2 a winter; 9 people 2 a summer; 6 pe	eople, 3 days t	raining	54	48	2.6	
	Lodging, 6 hights, 2 rooms (@ \$90/hightroom (Cordova, survey)			0 400	180	1.1	
	Loaging, 9 people, 14 nights	s, (vvnittier, survey plus boat training)			126	45	5.7	
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Those costs associated with program management should be indicated by placement of an *.						\$10.8		
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	Project Number: 02159					F	Personnel	
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2 of 4						04/11/2		

October 1, 2001 - September 30, 2002

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04/11/2001

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2002 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

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October 1, 200 - September 30, 2002

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Contractual Costs:		<u> </u>	Proposed
Description			FFY 1996
Charter vessel (win	ter), 10 days		20.0
Charter vessel (sun	nmer), 7 days		14.0
Harbor fees			0.5
Boat repairs and pa	ints		12.0
When a non-trustee org. Commodities Costs:	anization is used, the form 4A is required. Contract	ual Total	\$46.5 Proposed
Description			FFY 1996
Boat fuel (70 gal/da	y/boat) 60 boat-days/winter; 60 boat-days @ \$2.00/gal		16.8
Outboard oil (2 gal/boat/survey) 3 boats, 2 surveys @ \$12.00/gal			0.1
Food (\$10.00/person/day) 9 people for 30 days/winter; 9 people 30 days/summer			5.4
Rain gear, rubber b	oots and gloves for 6 people @ \$200/person		1.2
Scientific supplies (batteries for radios & other equipment, waterproof notebooks & paper, thermometers, wind guages	;)	1.2
Commodities Total			\$24.7
2002	Project Number:02159 Project Title: Marine Bird Boat Surveys Agency: DOI - Fish and Wildlife Service	FO Cont Corr D	RM 3B ractual & modities ETAIL

2002 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 200 ___ptember 30, 2002

New Equipment Purchases:		Number	Unit	Proposed
Description of Un		of Units	Price	FFY 1996
Emergency replacement of eq	uipment			1.5
Those purchases associated with r	replacement equipment should be indicated by placement of an R.	New Equ	ipment Total	\$1.5
Existing Equipment Usage:			Number	Inventory
Description			of Units	Agency
Camping supplies Survival suits Mustang suits Float coats			9 9 9	DOI -FWS DOI -FWS DOI -FWS DOI -FWS
2002 P	Project Number: 02159 Project Title: Marine Bird Boat Surveys Agency: DOI - Fish and Wildlife Service		F	ORM 3B quipment DETAIL

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APEX: Alaska Predator Ecosystem Experiment in Prince William Sound and the Gulf of Alaska Submitted Under the BAA

Project Number:	02163-BAA	APR 1 2 2001
Restoration Category:	Research	EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
Proposer:	David Cameron Duffy, Project Leader, Pauma	anok Solutions.
Cooperating Agencies:	DOI, ADF&G, NOAA	
Alaska SeaLife Center:	no	
Duration:	Final year of writing up of six-year project	
Cost FY 02:	\$31.1 K	
Geographic Area:	Prince William Sound, Cook Inlet, Northern	Gulf of Alaska
Injured Resource/Service:	Herring,	

ABSTRACT

This study used seabirds as probes of the trophic (foraging) environment of Prince William Sound, comparing their reproductive and foraging biologies, including diet, with similar measurements from Cook Inlet, an area with apparently a more suitable food environment. These measurements were then compared with hydroacoustic, aerial, and net sampling of fish to calibrate seabird performance with fish distribution and abundance. This allowed us to determine that food played a major role in limiting the recovery of seabirds from the *Exxon Valdez* oil spill. This final yearallows the production of a semipopular account by the Project Leader of the results and implications of the project.

INTRODUCTION

The spill from the oil tanker *Exxon Valdez* resulted in significant mortality of several seabirds and in massive acute damage to Prince William Sound (PWS) and the Gulf of Alaska (GOA) (Piatt *et al.* 1990). More than a decade following the spill, several species have not recovered. The APEX project examined the role of food in preventing recovery. We chose food as the focus because: 1) much of seabird population theory and several empirical field tests have identified food as an important limiting factor (Ashmole 1963; Cairns 1989; Birt *et al.* 1987; Furness and Birkhead 1984); 2) seabird/fish researchers in the PWS/GOA complex concluded that major changes in food have occurred during the period (Springer 1993; Anderson *et al.* 1994; Piatt and Anderson 1995); 3) other factors such as oil toxicity and climate change might express themselves through the food supply; and 4) knowledge of the forage prey base is critical for other apex predators, such as marine mammals and predatory fish (Pitcher 1980, 1981; Lowry *et al.* 1989), as well as for any larger effort to manage the marine resources of Prince William Sound, Cook Inlet and the Gulf of Alaska in a sustainable manner.

By examining the diet and reproductive consequences for a surface-feeder (black-legged kittiwakes, *Rissa tridactyla*), a benthic diver (pigeon guillemot, *Cepphus columba*), and two pelagic divers (tufted puffins, *Fratercula cirrhata*, and common murres, *Uria aalge*)), we built up a picture of the forage base for the entire seabird community, setting the stage for a long-term, low-cost monitoring program. The study provides between-year comparisons within sites and within-year comparisons between sites in Prince William Sound and Lower Cook Inlet, areas that have different food-availability. The comparisons between years allow us to assess the degree of variability of different food regimes, while the between-site comparisons will allow us to assess the responses of seabird communities to these same regimes. In addition, we used models to relate oceanographic and spatial features of Prince William Sound and the Gulf of Alaska to changes in seabird diet and population trends.

NEED FOR THE PROJECT

A. Statement of Problem

Numerous seabird species have declined between surveys in the 1970's and the 1990's in Prince William Sound: cormorants (*Phalacrocorax* spp.), kittiwake, glaucous-winged gull (*Larus glaucescens*), Arctic tern (*Sterna paradisaea*), Kittlitz's and marbled murrelets (*Brachyramphus brevirostris* and *B. marmoratus*), tufted and horned (*F. corniculata*) puffins, and pigeon guillemot (Agler *et al.* 1994 a,b; Klosiewski and Laing 1994). Colony trends for kittiwakes in Prince William Sound have been inconsistent, with colonies decreasing in the southern portion and increasing in the north (Irons unpubl. data). The population of pigeon guillemots in PWS has decreased from about 15,000 in the 1970's to about 3,000 in 1993 (Isleib and Kessel 1973; Oakley and Kuletz 1996). Based on censuses taken around the Naked Island complex, pre-spill counts were roughly twice as high as post-spill counts (Oakley and Kuletz 1993). Pigeon guillemots are listed as "Not recovering" in the *Exxon Valdez* Oil Spill Restoration Plan.

Common murres were among the species most damaged by the oil spill (Piatt *et al.* 1990), but most of the oiled birds nested outside PWS. Murres were also listed as "Not recovering" in the 1994 *Exxon Valdez* Oil Spill Restoration Plan, but have been upgraded to "recovering" because productivity has been normal since 1993 (Roseneau *et al.* 1995, 1996). Marbled Murrelets are also listed as Recovering.

The best evidence for a shift in trophic resources for seabirds within Prince William Sound comes

Prepared April 2001

Project 02163

from pigeon guillemots. No long-term diet data sets exist for other species or, like black-legged kittiwakes, diet exhibits great year to year variability. In 1994, sand lance (*Ammodytes hexapterus*) accounted for only about 1% of prey items fed to guillemot chicks at Jackpot Island and about 8% at Naked Island ; in contrast, in 1979 the sand lance component at Naked Island was about 55% (Kuletz 1983; Oakley and Kuletz 1993). Gadids were much more prevalent in the diet of guillemot chicks on Naked Island in 1994 (ca. 30%) than they were in 1979-1981 (< 7%) (Kuletz 1983).

Pre-spill studies of pigeon guillemots breeding at Naked Island suggest that sand lance are preferred prey during chick-rearing (Kuletz 1983). Breeding pairs that specialize on sand lance tended to initiate nesting attempts earlier and produce chicks that grew faster and fledged at higher weights than did breeding pairs that preyed mostly upon blennies and sculpins, at least in years when sand lance were readily available. Consequently, the overall productivity of the guillemot population was higher when sand lance were available.

The decline in the prevalence of sand lance in the diet of guillemots breeding at Naked Island might be a key element in the failure of this species to recover from the oil spill. The schooling behavior of sand lance, coupled with their high lipid content relative to that of gadids and nearshore bottom fish, might make this species a particularly high-quality forage resource for PWS pigeon guillemots. This is consistent with the observation that other seabird species (e.g., puffins, murres, kittiwakes) experience enhanced reproductive success when sand lance are available (Pearson 1968; Harris and Hislop 1978; Vermeer 1979, 1980; Monaghan *et al.* 1993).

Major oceanographic shifts seen in the northern Gulf of Alaska and North Pacific (Springer 1993; Piatt and Anderson 1995) may have favored pollock (*Theragra chalcogramma*), also an important seabird food (Springer and Byrd 1989) which has become one of the most abundant forage fish species currently available to seabirds (Parks and Zenger 1979; Brodeur and Merati 1993). Pollock may be an important competitor or predator of other forage fish species and may have suppressed populations of these species. Similarly, other species pairs may overlap in diet, such as herring and sand lance (McGurk and Warburton 1992) or pink salmon (*Oncorhynchus gorbuscha*) and sand lance (Sturtevant 1995), raising the possibility that reductions in the trophic role of one species may 'release' others from competition for food.

B. Rationale/Link to Restoration

Both scientific theory and common sense suggest that ecosystems change over time and that changes to one species or other component of the ecosystem may reverberate through the entire ecosystem (Pimm 1984; Wolfe and Kjerfve 1986). Such changes have occurred in the North Pacific and Gulf of Alaska (Hatch *et al.* 1993; Springer 1993; Piatt and Anderson 1995). Climate variations, fishing, or an oil spill may trigger changes that can take years to become apparent (Duffy 1993). Similarly, restoration efforts following the *Exxon Valdez* oil spill might increase injured species that are predators or competitors of other injured species, preventing their recovery several years after oil was removed as an immediate cause. By studying only the species level, we may miss such effects. An ecosystem approach, such as the APEX study of the upper-trophic level predators of Prince William Sound, is designed to look for such indirect links and to improve our understanding of the ecological context lacking from single-species work (Wheelwright 1994).

In conjunction with the former Sound Ecology Assessment and Nearshore Vertebrate Predators projects, ecosystem projects funded by the *Exxon Valdez* Oil Spill Trustee Council, APEX attempted to give us a basic understanding of the ecological processes that may affect future changes in upper trophic levels that may in turn affect restoration efforts and also help us to determine when we have finally restored a sustainable and healthy marine environment in the oil spill area.

Prepared April 2001

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C. Location

The project will use office-based locations for writing.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

None in this phase which draws only upon existing data and reports.

PROJECT DESIGN

A. Objectives

Produce a semipopular account of the APEX project, its context within the spill and the natural background necessary to understand the project, as well as the logistics and planning necessary for such a project.

B.____ Methods _____

Most of the data are already available in the APEX Final Report (January 2001) and many analyses of these data are already appearing in the primary scientific literature. This effort will be a twoauthor synthesis (Duffy and Wright) that pulls the work together into a readable form and context, and explains the complexities of field work and testing hypotheses about complex systems. The idea is to write "a good read" for the serious general reader, not just to the scientific audience that APEX has addressed previously.

Tentative Outline

- 1. PWS: History and Description
- 2. An Oil Spill Runs through it: Spill to court settlement
- 3. Is it Food? Underlying Questions and formation of APEX
- 4. APEX species: Birds
- 5. APEX Species: Fish
- 6. Spike camps, Zodiaks and Baths: Field work
- 6. Reproduction and bird species
- 7. Foraging and bird species
- 8. Climate and Scale: How many years is enough?
- 9. Lessons learned and unfinished business, or Is it Capelin?

In addition, funds are included in the project for a webmaster toput the APEX material (final reports, data, etc) on the web in a friendly form.

List of Subprojects

none

C. Cooperating Agencies, Contracts, and other Agency Assistance

This is a single contract through NOAA to Paumanok Solutions.

SCHEDULE

A. Measurable Project Tasks for FY 02

30 September 2002

Initial manuscript due.

31 December 2002

Manuscript due.

-Completion-Date ------

30 December 2002

PUBLICATIONS AND REPORTS

Subject to acceptance, a single book will be published in 2003.

PROFESSIONAL CONFERENCES

None budgeted

NORMAL AGENCY MANAGEMENT

not applicable

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This project is an integration of the APEX project, designed to provide an accessible synthesis of its results for the public and managers.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

NA

PRINCIPAL INVESTIGATORS

Project Leader David C. Duffy Paumanok Solutions 102 Aikahi Loop Kailua HI 96734 Tel (808) 254-1303 Email: david_duffy@sprynet.com

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	Authorized	Proposed		PROPOSED FF	Y 2002 TRUST	EE AGENCIES	STOTALS	
Budget Category:	FFY 2001	FFY 2002	ADEC	ADF&G	ADNR	USFS	DOI	NOAA
			\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$31.1
Personnel	\$15.1	\$6.3						
Travel	\$0.0	\$0.0						
Contractual	\$99.3	\$22.3						
Commodities	\$0.0	\$0.0						
Equipment	\$0.0	\$0.0		LONG RA	NGE FUNDING	G REQUIREME	ENTS	
Subtotal	\$114.4	\$28.6	Estimated	Estimated	Estimated	Estimated	Estimated	Estimated
General Administration	\$9.2	\$2.5	FFY 2003	FFY 2004	FFY 2005	FFY 2006	FFY 2007	FFY 2006
Project Total	\$123.6	\$31.1	\$10.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Full-time Equivalents (FTE)	0.2	0.1						
			Dollar amounts	s are shown in t	housands of do	llars.		
Other Resources								
for subsequent years. In 1995 the conjunction with collections of seat and their forage fish prey. Addition investigating of sand lance exposu study incorporated jellyfish (163S) as Samplers, was closed out in FY sample and data analysis, and writ dedicated to write up of synthesis t	Apex Predator E bird productivity al components of re to Exxon Valo investigations, a '96, 97163H PI v te up of final rep book in cooperat	cosystem Expe and energetics of APEX incorp dez oil. The FY and aerial surve withdrew from to ort and manusc tion with Alaska	eriment (APEX) data. The 1996 orated analysis 97 APEX study eys (163T) inves he project, and cripts for publica a Sea Grant, an	APEX project i of historic Gulf incorporated ma stigations. The la 163C and 163N ation. FY01 is de d placement of	ultaneous seab included related of Alaska trawl arbled murrelet ast field year fo I were closed o edicated to write the APEX final	Ind and hydroad d monitoring an data, ecosyste (163R) investig r APEX was FY ut in FY98. FY(e up of synthes report on the in	coustic surveys d research of s m modeling, an gations. The FY (99. The 163D, 00 is dedicated es papers. FY (nternet.	In eabirds d 798 APEX Puffins to D2 is
2002	Project Num Project Title: Lead Agency	ber: 02163 : APEX Synth y: NOAA	nesis	, , ,			F P	ORM 2A ROJECT DETAIL
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Budget Category:	Authorized	Proposed				nage an inn i namhaight an i nage an an i na an ann an i an i		
Budger Budger	1112001	FF1 2002						
Personnel		\$6.3						
Travel		\$0.0						
Contractual	:	\$22.3						
Commodities		\$0.0						
Equipment		\$0.0		LONG RA	NGE FUNDING	G REQUIREME	NTS	
Subtotal		\$28.6	Estimated	Estimated				
General Administration		\$2.5	FFY 2003	FFY 2004			1	
Project Total		\$31.1	\$10.0	\$0.0				
Full-time Equivalents (FTE)		0.1						
			Dollar amount	s are shown in	thousands of d	ollars.		
Other Resources								
components (01163G, 01163I, 0 00 is dedicated to sample and da syntheses papers. FY 02 is dedic internet.	ta analysis, and ta analysis, and cated to write up	, and 01163T), d write up of the o of synthesis b	as well as direct final report and ook in cooperat	t funding for the d manuscripts fo ion with Alaska	e Pls of APEX or publication. Sea Grant, an	components 01 FY01 is dedicat d putting the AF	163A and 01 ed to write up PEX final repo	i63L). FY of rt on the
2002	Project Num Project Title Agency: NC	nber: 02163 : APEX Synt DAA	hesis	атай Мараду-алууса 38 - 20- улагай				FORM 3A AGENCY PROJECT DETAIL

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2002 EXXON VALDEZ TR	E COUNCIL PROJECT BUDGET
October 1, 2001 -	September 30, 2002

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Pers	sonnel Costs:		GS/Bange/I	Monthel	Monthly		Proposed
1	Name	Position Description	Step	Budaeted	Costs	Overtime	FFY 2002
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Trav	vel Costs:			Hound	lotal	Dally Der Diem	Proposed
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	Project Number: 02163					Personnel	
	2002 Project Title: APEX Synthesis Agency: NOAA						& Travel

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Contractual Cost	ts:	Prop	osed
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Commodities Co	ists:	Prop	posed
Description		FFY	2002
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	Commodi	ies Total	\$0.0
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	Project Number: 02163	Contract	fual
2002	Project Title: APEX Synthesis	&	
	Agency: NOAA	Commod	lities
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New Equipment P	urchases:	Number	Unit	Proposed
Description		of Units	Price	FFY 2002
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I nose purchases a	ssociated with replacement equipment should be indicated by placement of an H.	New Eq	uipment i otal	\$0.0
Existing Equipme	nt Usage:		Number	Inventory
Description				Agency
				:
2002	Project Number: 02163			u linment
2002	Project Litle: APEX Synthesis			
	Agency: NOAA			
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	Authorized	Proposed						
Budget Category:	FFY 2001	FFY 2002						
Personnel	-	\$17.0						
Travel		\$1.6						
Contractual		\$0.0						
Commodities		\$0.0						
Equipment		\$0.0		LONG RA	NGE FUNDING	REQUIREME	NTS	
Subtotal		\$18.6	Estimated	Estimated	Estimated	Estimated	Estimated	1
indirect 20%		\$3.7	FFY 2002	FFY 2003	FFY 2004	FFY 2005	FFY 2006	
Project Total	\$28.0	\$22.3	\$0.0	\$0.0				
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Full-time Equivalents (FTE)		0.2						
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Other Resources	1				[T
Comments: FY02 is dedicated t	to write up of synth	neses book in c	coperation with	Alaska Sea Gi	rant.			
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	Project Num	ber: 02163	•					
2002	Project Title	APEX Synth	nesis					AGENCY
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Pers	sonnel Costs:			Monthsl	Monthly		Proposed
	Name	Position Description		Budgeted	Costs	Overtime	FFY 2002
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		Subtotal		2.0	8.500	()
					Pe	ersonnel Tota	\$17.0
Trav	vel Costs:		Ticket	Round	Total	Daily	Proposed
	Description		Price	Trips	Days	Per Diem	FFY 2002
	Honolulu, HI to	o Anchorage, AK (Restoration Workshop)	700	1	4	225	5 1.6
	1						0.0
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						Travel Tota	I \$1.6
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		Droject Number: 00169				E F	ORM 4B
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1	2002	Project Hile: APEX Synthesis					& Travel
		Agency. Faumanok Solutions					DETAIL





Description	
	FFY 2002
	1
Contractual Tot	\$0.0
Commodities Costs:	Proposed
Description	FFY 2002
Commodities Tota	\$0.0
	ORM 4B
Project Number: 02163	ontractual
Project Title: APEX Synthesis	&
Agency: Paumanok Solutions	DETAIL

New Equipment P	urchases:	Number	Unit	Proposed
Description		of Units	Price	FFY 2002
				0.0
				0.0
				0.0
				0.0
				0.0
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				0.0
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				0.0
				0.0
Those purchases a	issociated with replacement equipment should be indicated by placement of an R.	New Eq	uipment Total	\$0.0
Existing Equipme	nt Usage:		Number	Inventory
Description			of Units	Agency
		•		
	Project Number: 02163	1	F	ORM 4B
2002	Project Title: APEX Synthesis		Ec	uipment
	Agency: Paumanok Solutions			DETAIL

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Numerical and Functional Response of Seabirds to Fluctuations in Forage Fish Density

to Fluctuations in Forage Fis	h Density	RECEIVED		
Project Number: Restoration Category:	02163 M Research	APR 1 3 2000 EXX: IN VALDEZ OIL SPII I RUSTEE COUNCIL		
Proposed By:	U.S. Geological Survey (PI- John F.	Piatt)		
Lead Trustee Agency:	DOI			
Cooperating Agencies:	N/A			
Duration:	1 year			
Cost FY 02:	\$82,500 (data analysis, reporting)			
Geographic Area:	Cook Inlet, Gulf of Alaska			
Injured Resource:	Multiple resources			

ABSTRACT

Cook Inlet Seabird and Forage Fish Studies (CISeaFFS) was established in 1995 with EVOSTC (APEX) and USGS funding to measure the foraging (functional) and population (numerical) responses of seabirds to fluctuating forage fish densities around three seabird colonies in lower Cook Inlet. This involved at-sea surveys for forage fish (hydroacoustics, trawling, seining) and seabirds (line transects), and some characterization of oceanography (AVHRR satellite imagery, CTD profiles, moored thermographs), while measuring aspects of seabird breeding biology (egg and chick production, chick growth, population trends) and foraging behavior (diets, feeding rates, foraging time) at adjacent colonies. Following completion of a final report and data archive, we are now trying to finalize some synthetic papers on the work.

INTRODUCTION

Some seabird populations in the Gulf of Alaska declined markedly during the past few decades. Whereas human impacts such as those from the Exxon Valdez oil spill can account for some proportion of these declines, natural changes in the abundance and species composition of forage fish stocks have also affected seabird populations. Marine fish communities in the Gulf of Alaska changed dramatically during the past 20 years. Coincident with cyclical fluctuations in sea-water temperatures, the abundance

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of small forage fish species such as capelin (*Mallotus villosus*) declined precipitously in the late 1970's while populations of large predatory fish such as walleye pollock (*Theragra chalcogramma*) and cod (*Gadus pacifica*) increased dramatically. Correspondingly, capelin virtually disappeared from seabird diets in the late 1970's, and were replaced by juvenile pollock and other species in the 1980's. Seabirds and marine mammals exhibited several signs of food stress (population declines, reduced productivity, die-offs) throughout the 1980's and early 1990's.

NEED FOR THE PROJECT

A. Statement of the Problem

Factors that regulate seabird populations are poorly understood, but food supply is clearly important. In many cases, anthropogenic impacts on seabird populations cannot be distinguished from the consequences of natural variability in food supplies. Thus, 'management' of seabird populations remains an uncertain exercise. For example, how can we enhance or predict recovery of seabird populations lost to the *Exxon Valdez* oil spill if food supplies in the Gulf of Alaska limit reproduction?

B. Rationale

To address these questions, the EVOSTC initiated APEX (Apex Predator Ecosystem Experiment) in 1995. In Cook Inlet, pilot studies were initiated with USGS and MMS support in 1995, and expanded in 1996 with substantial APEX support. The overall objective was to quantify and contrast seabird-forage fish relationships at three seabird colonies in lower Cook Inlet: Chisik Island, Gull Island (Kachemak Bay), and the Barren Islands (research there conducted and reported by the Alaska Maritime National Wildlife Refuge). The abundance and species composition of forage fish schools around each colony were quantified with hydroacoustic surveys, mid-water trawls, and beach seines. At each colony, we measured breeding success, diet composition, and foraging effort of several seabird species including: common murres, black-legged kittiwakes, pigeon guillemots, pelagic cormorants, glaucous-winged gulls, tufted puffins and horned puffins.

In 1997 and 1998, this research program was refined and expanded where appropriate. For example, we included benthic trawling nearshore since 1997, increased study effort on pigeon guillemots, added nearshore sampling for zooplankton, phytoplankton and nutrients (in collaboration with Peter McRoy, UAF), studied physiological responses of adult and chick seabirds to food stress, begun to measure adult survival of murres and kittiwakes on Gull and Chisik islands, and increased coordination of seabird studies at the three colonies using protocols developed in collaboration with other principal investigators in the EVOS/APEX program. The basic components of this study have not changed, however, and we measured the same fundamental parameters of forage fish and seabird biology for the duration of the study (1995-1999).

C. Location

The remaining work will take place at the Alaska Biological Science Center and University of Washington.

COMMUNITY INVOLVEMENT AND TRADITIONAL ECOLOGICAL KNOWLEDGE

None in this phase which draws only upon existing data and reports

PROJECT DESIGN

A. Summary of field work and findings to date

The main field program occurred in 1995-1999, however, we continued to collect data on seabird survival and stress in 2000 and 2001. Main results of the main study can be found in the final report to the EVOSTC. In summary, populations, productivity, diets and foraging behavior of murres and kittiwakes were studied at three seabird colonies in lower Cook Inlet (Chisik, Gull and Barren islands). Ancillary data were also collected on Tufted and Horned Puffins, Cormorants (spp.) and Glaucous-winged Gulls. Pigeon Guillemots were studies in Kachemak Bay only. Here we focus on the two main study species: Common Murres and Black-legged Kittiwakes. Oceanographic measurements, seabird and hydroacoustic surveys, trawls, and beach seines were conducted in waters around (<45 km) each colony.

In all years, offshore and southern waters of Cook Inlet were dominated by juvenile walleye pollock, important prey for murres and puffins. Nearshore waters of Cook Inlet were dominated by sandlance, which were consumed by seabirds (e.g., kittiwakes, guillemots, murres) in proportion to their local abundance. Other important prey species included capelin, smelts, and herring. More than 80 fish were captured in nets during the study. The CPUE of forage fish in either mid-water trawls or beach seines around Chisik Island was typically 1-2 orders of magnitude less than around the Barren Islands or in Kachemak Bay. Acoustically-measured forage fish biomass was lowest around Chisik Island, moderate around the Barrens and highest in Kachemak Bay. Water temperatures throughout the summers of 1995-1999 were similar and near long-term averages, except that temperatures in winter of 1997/98 were about 1-2 C higher than in previous years owing to warming from El Niño.

The breeding biology of seabirds differed markedly among colonies owing to differences in food supply, which in turn reflect differences in oceanography among areas. Over all years, breeding success of murres and kittiwakes was highest and least variable at Gull Island, high and more variable at the Barrens, and lowest at Chisik. Breeding success in most species (including gulls, cormorants, puffins) was lower in 1998 than in other years. Murres on Chisik Island had a near reproductive failure. Measures of baseline corticosteroid levels suggest that murres on Chisik were highly stressed even before they attempted to lay eggs in July. A large die-off of murres was observed in Cook Inlet in April and May of

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1998, and although most birds affected were subadults, this die-off foreshadowed the poor breeding season for murres during summer of 1998.

Population censusing revealed that seabirds at Chisik Island continue in a long-term decline (ca. -4% to -9% per annum), whereas populations at Gull and Barren islands are increasing (ca. 5% to 9% p.a.). Behavioral studies reveal that seabirds work harder (longer foraging trips, less "free" time) at colonies or in years when nearby fish densities are lower. Preliminary results of survival studies suggest that the survival rate of adult kittiwakes on Chisik Island (where parental investment is low owing to typical failure to raise young) is substantially higher than on Gull Island (where chick fledging is typically high). In contrast, survival of adult murres-- which usually manage to fledge chicks at both colonies-- is lower at Chisik than at Gull, presumably because the cost of raising and fledging chicks is higher at Chisik.

Overall, the results show that seabird parameters (breeding success, foraging effort, diets, etc.) vary most between islands, and least between years. We attribute this regional stability in biological responses to distinct oceanographic regimes around each colony that tend to strongly influence the biology of birds within those areas. Thus, all measured seabird parameters varied some between years, but, for example, kittiwakes at Gull Island always fared much better than those at Chisik. While each colony responded differently to the ENSO perturbation of 1997/98, responses were commensurate with the underlying physical and biological regime observed in each area.

As predicted, the numerical and functional responses of seabirds to food density was generally nonlinear. There were fundamental differences in response of murres and kittiwakes, owing to inter-species differences in metabolic demands and foraging abilities. In general, kittiwakes are hard-pressed throughout breeding to meet energy demands. They lay multiple-egg clutches and try to hatch and raise as many chicks possible, but pairs must forage 16 or more hours a day on average even when food supplies are good. Consequently, they have little discretionary time to buffer against change in food supply, and therefore fledging success is strongly correlated (in sigmoidal fashion) with local food density. In contrast, murres lay and hatch only one egg, and pairs spend only about 12 hours per day foraging when food supplies are average to good. When food supplies become scarce, murres compensate by spending more discretionary time foraging, and therefore fledging success in murres is not correlated with local food supply, whereas discretionary "loafing time" is strongly correlated (in sigmoidal fashion) with food density.

Aside from these differences in foraging time budgets and in their ability to buffer reproductive success against changes in prey density, murres and kittiwakes actually responded to prey variability in some similar ways. In the face of high variability (CV=80%) in prey abundance among 3 colonies and 5 years, both species minimized variability in their own body condition (CV<10%), variability in attendance by at least one adult at nest sites (<10%) and growth of young (CV<15%). In both species, foraging behaviors (trip duration, chick feeding rate) were moderately variable (CV = 15-25%); as were some breeding parameters (laying success, hatching success, CV=20-40%). In both species, variability in density of adults foraging at sea was similar (CV = 70-75%) to variability in prey abundance. In both species, variability in co-attendance of both adults at nest sites (index of discretionary "loafing time")

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was of a similar or higher magnitude (CV = 65-140%) to variability in prey abundance. As noted above, the only real difference among species was that murres were able to use discretionary time to buffer breeding success (CV < 30%) against variability in prey abundance whereas kittiwakes could not (breeding success CV = 90%, i.e., the same variability as prey abundance).

In general, these results are consistent with life history theory which suggests that long-lived, iteroparous seabirds should not invest so much in any one breeding attempt that adult survival is disproportionately affected. In the face of environmental variability, adults of both species tend to maintain their own body condition first, and maintain their chicks second. Flexibility is found in their behavioral responses to fluctuations in prey density, including foraging effort, prey selection (quality and quantity), use of discretionary time, etc., allowing birds to moderate effects of food variability on predation, food acquisition and chick feeding rates.

Considering the functional and numerical responses of murres and kittiwakes to prey abundance at the three study colonies, the average abundance of prey around each colony, and the deviation of seabird parameters (e.g., breeding success, foraging effort, attendance, etc.) from averages of all colony-years studied, it appears that food supplies at Gull and Barren islands, but not at Chisik, are presently adequate to support recovery of losses from the Exxon Valdez oil spill.

B. Objectives for FY02

In FY 2000 and 2001 we completed our data archive and our final report which included all significant findings and provides a preliminary synthesis and interpretation of results. After revisions based on reviewer's comments, this report will constitute a final repository for raw and summarized data, provide documentation of methods for the entire project, and serve as a useful reference for researchers who may wish to conduct research in lower Cook Inlet in the future.

Our main objective in FY 2002 is to write and publish a number of synthetic papers. The following lists indicate priority products for FY02, as well as products completed to date.

Cook Inlet related manuscripts proposed for write-up in FY02:

"The role of food supply and environmental variability in the regulation of seabird populations" (adapted from Chapter 14 in Final Report, synthesis of major findings on Cook Inlet environment, fish, and seabird biology and behavior) {Piatt et al.} Ecological Monographs

"Feeding ecology of Common Murres and Black-legged Kittiwakes in relation to food availability in lower Cook Inlet". (details of adult and chick diet composition, prey characteristics, prey selection versus availability, energy delivered to chicks) {Van Pelt, Shultz, Litzow et al.} Marine Ecology Progress Series "Chick feeding rates, foraging time budgets, and nest site attendance of Common Murres and Blacklegged Kittiwakes at three colonies with differing food regimes" (details and synthesis of behavioral data in relation to food) {Shultz, van Pelt, Harding et al.} Behavioral Ecology

"Breeding biology of Common Murres and Black-legged Kittiwakes in relation to food availability" (details and synthesis of data on laying, hatching, fledging and overall breeding success, chick growth and body condition of adults and chicks, in relation to food). {Litzow, Shultz, Harding, et al.} Ecology

"Spatial associations of seabirds and their prey around three colony sites in Lower Cook Inlet, Alaska" (measure and compare degrees of aggregation of birds and prey at varying scales to examine how seabird foraging patterns and strategies vary with changes in prey abundance, distribution, and species composition) {Speckman et al.} Marine Ecology Progress Series

"Foraging ecology of seabirds in Lower Cook Inlet, Alaska" (Ph.D. dissertation, University of Washington, School of Fisheries. Will consist of 3 main chapters, each addressing different aspects of the foraging ecology of seabirds, i.e., oceanographic influences on prey dispersion, characteristics of prey schools used by seabirds, temporal and spatial association of seabirds and their prey) {Speckman}

"Costs of egg production in common murres" (from M.Sc. thesis, results of manipulative experiment to assess reproductive costs of egg production at a food stressed colony) {Van Pelt et al.} Oecologia

"Breeding biology and feeding ecology of horned puffins at Chisik Island, Alaska" (from M.Sc. thesis, self-explanatory, details of 5 years of research) {Harding, Piatt, et al.} Condor

Cook Inlet related manuscripts, papers, and theses completed or in final stages of preparation:

- Piatt, J.F., et al. 2001. Can seabirds recover from effects of the Exxon Valdez oil spill? (adapted from Chapter 14 of Final Report, consideration of ecological factors limiting recovery, current status of colonies in Cook Inlet, and forecast of future) for Biological Conservation
- USGS and USFWS. 2001. Numerical and Functional Response of Seabirds to Fluctuations in Forage Fish Density. Exxon Valdez Oil Spill Restoration Project Final Report (Restoration Project 00163M), Alaska Biological Science Center, U.S. Geological Survey, Anchorage, Alaska. 450 pp.
- Harding, A., J.F. Piatt, T. Van Pelt and A. Kitaysky. 2001. Parental Flexibility: An experimental reduction of provisioning effort in response to chick nutritional status in the Horned Puffin (*Fratercula corniculata*). Mss. submitted to Behavioural Ecology and Sociobiology.
- Harding, A. M. 2001. The breeding ecology of Horned Puffins *Fratercula corniculata*. M.Sc. Thesis, University of Durham, England. 74 pp.
- Abookire, A.A., J.F. Piatt, and B.L. Norcross. 2001. Summer habitat of juvenile groundfishes in Kachemak Bay, Alaska. *Accepted*. Alaska Fisheries Research Bulletin.
- Litzow, M. A., J. F. Piatt, A. K. Prichard and D. D. Roby. 2001. Quality- predictability tradeoffs: Reproductive consequences of prey availability for the pigeon guillemot. Submitted to Ecologia.

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- Litzow, M. A. and J. F. Piatt. 2001. Time budgets of breeding Pigeon Guillemots: Effects of foraging ecology, body size and life history. *In prep.*, for submission Behavioural Ecology.
- Litzow, M., J. Fischer, G. Golet, J. Piatt. 2001. Foraging effort of breeding Pigeon Guillemots: are high quality prey harder to catch? *In preparation*. For submission to Auk.
- Kitaysky, A., J. Wingfield, and J. Piatt. 2000.Corticosterone facilitates begging and affects resource allocation in the Black-legged Kittiwake. *In Press.* Behavioral Ecology.
- Litzow, M.A. 2000. Food limitation in a generalist seabird: reproductive consequences of fodd quality and prey switching in the Pigeon Guillemot (*Cepphus columba*). M.Sc. Thesis, University of California, Santa Cruz, CA. 36 pp.
- Van Pelt, T.I. 2000. Reproductive costs and their expression in the Common Guillemot Uria aalge. M.Sc. Thesis, University of Glasgow, Scotland. 119 pp.
- Romano, M.D. 2000. Effects of diet on growth and development of nestling seabirds. M.Sc. Thesis, Oregon State University, Corvallis OR. 59 pp.
- Abookire, A.A., J. F. Piatt and M.D. Robards. 2000. Nearshore fish distributions in an Alaskan estuary in relation to stratification, temperature and salinity. Estuarine, Coastal and Shelf Science 51: 45-59.
- Piatt, J.F. and A.S. Kitaysky. 2000. Horned Puffin (*Fratercula corniculata*). In The Birds of North America (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists Union. Mss. Accepted.
- Litzow, M.A., J.F. Piatt, A.A. Abookire, A.K. Prichard, and M.D. Robards. 2000. Monitoring temporal and spatial variability in sandeel (*Ammodytes hexapterus*) abundance with pigeon guillemot (*Cepphus columba*) diets. ICES Journal of Marine Science 57: 976-986.
- Seiser, P. E., L. K. Duffy, A. D. McGuire, D. D. Roby, G. H. Golet, and M. A. Litzow. 2000. Comparison of pigeon guillemot, *Cepphus columba*, blood parameters from oiled and unoiled areas of Alaska eight years after the *Exxon Valdez* oil spill. Marine Pollution Bulletin 40:152-164.
- Robards, M.D. 2000. Ecology and demographics of Pacific sand lance, *Ammodytes hexapterus* Pallas, in lower Cook Inlet, Alaska. M.Sc. Thesis, Memorial University of Newfoundland, St. John's, Canada. 105 pp.
- Robards, M.D., G.A. Rose, and J.F. Piatt. 2000. Oceanographic effects on abundance, somatic growth and otolith development of Pacific sand lance in lower Cook Inlet, Alaska. Environmental Biology of Fishes. *Accepted*.
- Ostrand, W. D., T. A. Gotthardt, S. Howlin, J. Kern, and M. D. Robards. 2000. Habitat selection by Pacific sand lance in Prince William Sound, Alaska. *In preparation*. To be submitted to Fishery Bulletin.
- Anderson, P.J., and J.F. Piatt. 1999. Community reorganization in the Gulf of Alaska following ocean climate regime shift. Marine Ecology Progress Series 189:117-123.
- Piatt, J.F., G. Drew, T.Van Pelt, A. Abookire, A. Nielsen, M. Shultz, and A. Kitaysky. 1999. Biological effects of the 1997/1998 ENSO event in lower Cook Inlet, Alaska. PICES Scientific Report No. 10:93-100.
- Robards, M.D., J.F. Piatt, A.B. Kettle, and A.A. Abookire. 1999. Temporal and geographic variation in fish communities of lower Cook Inlet, Alaska. Fisheries Bulletin 97: 962-977.

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- Kuletz, K. and J.F. Piatt. 1999. Juvenile Marbled Murrelet nurseries and the productivity index. Wilson Bulletin 111:257-261.
- Piatt, J.F., N.L. Naslund, and T.I. van Pelt. 1999. Discovery of a new Kittlitz's Murrelet nest: Clues to habitat selection and nest-site fidelity. Northwestern Naturalist 80:8-13.
- Robards, M.D., J.F. Piatt, and G.A. Rose. 1999. Maturation, fecundity and intertidal spawning of Pacific Sand Lance (*Ammodytes hexapterus*) in the northern Gulf of Alaska. Journal of Fish Biology 54: 1050-1068.
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- Kitaysky, A.S. 1999. Metabolic and developmental responses of alcid chicks to experimental variation in food intake. Physiological and Biochemical Zoology 72: 462-473.
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- Kitaysky, A.S., J.C. Wingfield, and J.F. Piatt. 1998. Dynamics of food availability, body condition and physiological stress response in breeding Black-legged kittiwakes. Functional Ecology 13:577-584.
- Litzow, M.A., J.F. Piatt, and J.D. Figurski. 1998. Hermit crabs in the diet of Pigeon Guillemots at Kachemak Bay, Alaska. Colonial Waterbirds. 21:242-244.
- Zador, S., and J.F. Piatt. 1998. Time-budgets of Common Murres at a declining and increasing colony in Alaska. Condor 101:149-152.
- Ostrand, W. D., K. O. Coyle, G. S. Drew, J. M. Maniscalco, and D. B. Irons. 1998. Selection of forage fish schools by murrelets and Tufted Puffins in Prince William Sound, Alaska. Condor. 100:286-297.
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- Piatt, J.F., D.D. Roby, L. Henkel, and K. Neuman. 1998. Habitat use, diet, and breeding biology of Tufted Puffins in Prince William Sound, Alaska. Northwestern Naturalist 78:102-109.
- Van Pelt, T., J.F. Piatt, B.K. Lance, and D.D. Roby. 1997. Proximate composition and energy density of some North Pacific forage fishes. Comparative Biochemistry and Physiology 118(A): 1393-1398.
- Kuletz, K.J., D.Irons, J.F. Piatt, B. Agler and D.C. Duffy. 1997. Long-term changes in populations and diets of piscivorous birds and mammals in Prince William Sound, Alaska. Proceedings, Forage Fishes in Marine Ecosystems. Alaska Sea Grant College Program, University of Alaska Fairbanks, AK-SG-97-01: 703-706.
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- Piatt, J.F., and R. G. Ford. 1996. How many seabirds were killed by the *Exxon Valdez* oil spill?
 Pp. 712-719 in: Exxon Valdez Oil Spill Symposium Proceedings. Rice, S. D., R. B.
 Spies, D. A. Wolfe and B. A. Wright, (Eds). American Fisheries Society Symposium 18, Bethesda, Maryland.
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C. Cooperating Agencies, Contracts, and Other Agency Assistance

Writing of papers will be conducted in collaboration with personnel at the Alaska Maritime National Wildlife Refuge, USFWS. Contracts will be issued to support Suzann Speckman and Ann Harding.

SCHEDULE

A. Measurable Project Tasks for FY 02

June 30, 2003 Final Synthesis Manuscripts Completed.

B. Project Milestones and Endpoints

September 30, 2003 All final manuscripts for synthesis submitted for journal publication.

C. Completion Date

September 30, 2003

PUBLICATIONS AND REPORTS

See objectives above for publications.

PROFESSIONAL CONFERENCES

None budgeted

NORMAL AGENCY MANAGEMENT

N/A

2002 EXXON VALDEZ TRU: October 1, 200

COUNCIL PROJECT BUDGET sptember 30, 2002

Budget Category:	Authorized FY 2001	Proposed FY 2002						
Personnel Travel		\$34.5 \$0.0			• •			
Commodities		\$0.0						
		\$0.0						
General Administration	φ υ.υ		F 12003					
Project Total	\$0.0	\$82.5						
Full-time Equivalents (FTE)		0.8						
			Dollar amounts are show	n in thousan	ds of dollars.			
Other Resources								
FY02	Project Nur Project Title Agency: US	nber: 0 8 163 e: Response GGS	3M e of Seabirds to Forag	ge Fish De	nsity		FO TR AG SUI	RM 3A USTEE SENCY MMARY

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COUNCIL PROJECT BUDGET

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			N.4	N			
Personnel Costs:		- GS/Range/	Ivionths	IVIONTINIY		Proposed	
Name	Position Description	Step	Budgeted	Costs	Overtime	FY 2000	
T. van Pelt	Wildlife Biologist	GS9	3.0	4,062		12.2	
M. Shultz	Wildlife Biologist	GS7	3.0	3,357		10.1	
M. Litzow	Wildlife Biologist	GS9	3.0	4,062		12.2	
						0.0	
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	Subtota	1	9.0	11481.0	0.0		
Per					sonnel Total	\$34.5	
Travel Costs:		Ticket	Round	Total	Daily	Proposed	
Description		Price	Trips	Days	Per Diem	FY 2000	
						0.0	
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			· · · ·		Travel Total	\$0.0	
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	Project Number: 00163M					Dersonnol	
FY02 Project Title: Response of Seabirds to Forage Fish Density						Feisonnei	
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					1	DETAIL	

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2002 EXXON VALDEZ TRU: October 1, 20(

COUNCIL PROJECT BUDGET eptember 30, 2002

Contractual Costs:		Proposed
Description		FY_2000
4A LS. Speckman, Research Work order with the University of Washington Final year of support for PhD thesis in School of Fisheries		35.0
A. Harding, contract with Durham Univ. to complete publications		5.0
		l .
When a non-trustee organization is used, the form 4A is required.	otal	\$40.0
Commodities Costs:		Proposed
Description		FY 2000
Commodities T	otal	\$0.0
FY02 Project Number: 00163M Project Title: Response of Seabirds to Forage Fish Density Agency: USGS	F Cor Co	ORM 3B ntractual & mmodities DETAIL

2002 EXXON VALDEZ TRU

COUNCIL PROJECT BUDGET

October 1, 20(eptember 30, 2002

New Equipment Purchases:	Number	Unit	Proposed
Description	of Units	Price	FY 2000
			0.0
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			0.0
			0.0
			0.0
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			0.0
			0.0
Those purchases associated with replacement equipment should be indicated by place	ment of an R. New Equ	ipment Total	\$0.0
Existing Equipment Usage:		Number	Inventory
Description		of Units	Agency
		<u>·</u>	
Project Number: 00163M		F	ORM 3B
EV02	a Fich Danaity		auipment
FIVE Project Title: Response of Seabirds to Forag	e rish Density		DETAIL
Agency: USGS			

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Construction of a Linkage Map for the Pink Salmon Genome

Project Number: Restoration Category: Proposer:

Lead Trustee Agency: Alaska SeaLife Center: Duration: Cost FY 02: Cost FY 03: Geographic Area: Injured Resource: 02190 Research Fred W. Allendorf University of Montana ADFG No 7th year, 8-year project \$157,000 \$75,000 Prince William Sound Pink salmon



EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

ABSTRACT

We will complete the analysis of experiments conducted at the Alaska SeaLife Center (ASLC) that use the linkage map we have constructed to test for effects of regions of the genome on traits that are important to recovery of pink salmon (e.g., growth and survival). Sexually mature adults from the 1999 cohorts produced from wild pink salmon collected from Likes Creek are expected to return to Resurrection Bay and the ASLC in August and September 2001. We will compare genotypes in released fry and returning adults to test for genetic differences in marine survival and other life history traits (e.g., body size, egg number, and egg size).

INTRODUCTION

This is the final phase of our research to construct a genetic linkage map for pink salmon (*Oncorhynchus gorbuscha*) and to use this map to evaluate effects of natural selection on the genome of this species. Such a map was proposed initially to provide the necessary platform to identify genetic damage in pink salmon inhabiting oiled streams following the March 1989 *Exxon Valdez* oil spill (EVOS). We have conducted a series of experiments based at the Alaska SeaLife Center (ASLC) to identify regions of the genome that affect various organismal traits and to test for the effects of natural selection on regions of the genome that include markers used to describe genetic population structure. This research will aid recovery efforts with pink salmon, including estimation of straying rates, description of stock structure, and testing if marine survival and other organismal measures of phenotypic variation have a genetic basis.

Genetic linkage maps have provided the necessary information for understanding genetic variation in species since the rediscovery of Mendel's principles early in this century. A genetic map plays a similar role for a geneticist that a geographical map plays for the explorer of new territories. For many years, genetic maps could only be constructed in a very few model species that were suitable for extensive genetic manipulation (e.g., *Drosophila* and mice). Recent advances in molecular genetics now make it possible to uncover enough genetic markers to construct a detailed genetic linkage map in almost any species (Postlethwait et al. 1994).

This project began in FY 96. However, we did not receive authorization to proceed until halfway through FY 96 (March 1996). We have completed our two initial objectives that included identifying several hundred genetic markers and using them to construct a linkage map. We have used the ASLC for experiments that apply the linkage map to an understanding of the fundamental population biology and genetics of pink salmon.

This work was originally designed to support work with pink salmon under the project *Oil-Related Embryo Mortalities* (Restoration Study \191A). The objective of that project was to identify germline mutations in pink salmon exposed to oil. Genetic damage induced by oil may either be small changes in nucleotide sequence (microlesions) or large-scale changes in chromosome structure (macrolesions). A detailed genetic map for pink salmon would have been invaluable for interpreting the results of Restoration Study \191A in several ways. First, it would be possible by following the inheritance of any DNA lesions to determine if they are micro- or macro-lesions. Second, these lesions could be mapped to determine if they are randomly spread throughout the genome or if they occur at mutational "hot spots" that are susceptible to oil induced damage. However, Restoration Study \191A is no longer ongoing, and thus our future work will concentrate on our original Objectives 5 and 6 as described in this proposal.

We modified our proposal last year because we found high mutation rates at two microsatellite loci. These mutations are not randomly distributed among families, but some are "clustered" in certain families. The rates and especially the patterns of mutations that we have observed have provided some important fundamental insights into the evolution of microsatellite loci and their use in population genetic studies. Results with humans have found an increase in mutation rates at minisatellite loci following exposure to radiation following the Chernobyl

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incident (Dubrova et al. 1996). Our recent results raise the possibility that microsatellite loci may also be good candidates for monitoring germline mutations in marine species following exposure to oil.

We are continuing our experiments at the ASLC to test for regions of the genome associated with marine survival and fitness. We released nearly 50,000 progeny in spring 1999, and anticipated a 2-5% return rate in our original experimental design. Due to the failure of the fish pass at the ASLC to attract returning marked adults we captured only 36 fish from nearby freshwater streams in Resurrection Bay. The collection of these fish from such a large system indicates that a substantial number of marked fish did survive and return to Resurrection Bay. We were not able to complete any of our objectives with the 1998 cohort because of the poor returns. We have adjusted our plans for recapturing returning adults from the 1999 cohort when they return to Resurrection Bay in the hopes of collecting an adequate sample for analysis.

NEED FOR THE PROJECT

A. Statement of Problem

Elevated embryo mortalities were detected in populations of pink salmon inhabiting oiled streams following the spill. These increased rates of mortality persisted through the 1993 field season, three generations after the oil spill, suggesting that genetic damage may have occurred as a result of exposure to oil during early developmental life-stages. The consequences of the putative genetic damage include impaired physiological function of individuals and reduced reproductive capacity of pink salmon populations (Bue et al. 1998).

The aggregate of evidence from field studies and incubation experiments suggests that embryos exposed to oil in 1989 and 1990 accumulated deleterious mutations in the germline (Bue et al. 1998). However, see Cronin and Bickham (1998) for an alternative interpretation of these data. This hypothesis of genetic damage is consistent with previous field observations and laboratory experiments on the effects of crude oil on early life stages of fish. Long term intra-gravel oil exposures (7-8 months) to freshly fertilized eggs provide embryos sufficient time to accumulate polynuclear aromatic hydrocarbons (PAH's) from very low aqueous concentrations of crude oil. PAH's are abundant in crude oil and are potent clastogens (i.e. capable of breaking chromosomes). Roy et al. (1999) have recently reported evidence of molecular genetic damage to pink salmon embryos exposed to crude oil.

Mironov (1969) observed reduced survival of fish embryos and larvae exposed to very low aqueous doses (1 ul oil/L seawater) of oil. Longwell (1977) reported genetic damage in pelagic embryos affected by the ArgoMerchant oil spill. Moles et al. (1987) confirmed that pink salmon embryos take up PAH's and demonstrated that the uptake was much greater in an intertidal environment than in strictly freshwater conditions. Biggs et al. (1991) found greater numbers of chromosome aberrations in larval herring that incubated in oiled areas than in non-oiled areas. It is likely that the same type of damage may have occurred in pink salmon and other species in Prince William Sound, and this damage could have affected the germline of exposed individuals

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(Malkin 1994; Bue et al. 1998).

Molecular genetic techniques have been used extensively to describe population structure of Pacific salmon (Utter et al. 1993; Gharrett and Smoker 1994; Seeb et al. 1998). Genetic divergence among populations has been interpreted as largely reflecting the patterns of exchange of individuals among populations (gene flow) and random changes in frequency of selectively neutral alleles within populations (genetic drift) (Allendorf and Phelps 1981; Waples 1995). This is a useful approach that allows description of the pattern and amount of gene flow among populations.

This approach to describe population structure is based upon the assumption that the pattern and amount of divergence observed is not affected by natural selection or mutation. However, even weak natural selection may have a substantial effect on the pattern of genetic divergence among populations (Allendorf 1983). In addition, different mutation rates at marker loci may also effect the amount of genetic differentiation between populations, in particular if mutation rates at some loci are high (e.g., Jin and Chakraborty 1995). Thus, the high frequency of mutations that we have detected may also have a substantial effect on the amount and pattern of genetic divergence at some loci.

Molecular markers may be affected by natural selection even if the markers themselves are not the target of selection. Loci that are selectively neutral and have no effect on the phenotype are expected to be affected by the action of natural selection at closely linked loci (Slatkin 1995). Apparent heterozygous advantage ("associative overdominance") can result at neutral loci by linkage disequilibrium with nearby loci that are affected by natural selection (Pamilo and Pálsson 1998). Zhivotovsky et al. (1994) have recently questioned the description of genetic population structure of pink salmon and suggested that natural selection may have an important effect on allozyme frequency divergence in pink salmon.

It has been notoriously difficult to detect and measure the effects of natural selection in natural populations (Lewontin 1991). Comparing the distribution of genotypes in a single cohort followed through different life history stages is the most powerful method to detect natural selection (p. 303, Lynch and Walsh, in preparation). The facilities at the ASLC provide an exceptional opportunity to measure lifetime fitness from fertilization to sexual maturity of molecular genetic markers spread throughout the genome identified in previous years of this project.

B. Rationale/Link to Restoration

The recovery objective for pink salmon is healthy and productive populations that exist at prespill levels or levels in unoiled areas. An indication of recovery is when egg mortality in oiled areas match prespill or levels in unoiled areas. A genetic map would be essential for detecting and understanding causes of reduced egg and embryo survival in oiled areas (Bue et al. 1998). The genetic damage caused by exposure to oil may persist longer in populations of pink salmon than in other vertebrates because of the tetraploid nature of the salmonid genome. Salmonid fishes went through a tetraploid event some 25 million years ago that duplicated their entire genome

(Allendorf and Thorgaard 1984). The extra genes in pink salmon may mask the effects of mutational damage caused by recessive deleterious alleles. The effects of these deleterious mutations may be uncovered in subsequent generations.

This research will provide a powerful test of the assumption of the absence of natural selection affecting molecular markers. This assumption is the foundation of interpreting patterns of genetic divergence among populations as reflecting patterns of genetic exchange. Evidence of natural selection affecting the molecular markers would cause a major change in the interpretation of genetic variation in natural populations of pink salmon and other species. This will be true whether the selection is acting on the markers themselves or chromosomal segments linked to the markers. Recent results from molecular studies of the genome suggest that natural selection may play a greater role than previously thought in determining the structure of the genome, including the organization of genes and chromosomes, as well as the patterns and amounts of genetic variation present (Hurst 1999).

C. Location

Gametes for the inheritance studies and linkage map were collected from Prince William Sound in collaboration with the project Oil-Related Embryo Mortalities (Restoration Study \191A). Embryo incubation took place at the Genetics Lab facilities of ADFG. The laboratory analyses were done at the University of Montana and the ADFG genetics lab in Anchorage.

We began in FY 1998 to use the ASLC Research Facilities at Seward for experiments designed to test for natural selection at loci throughout the genome of pink salmon. Sexually mature pink salmon used in the experimental matings in 1998 and 1999 were collected from Likes Creek in Resurrection Bay. The progeny were marked with an adipose fin clip and released into Resurrection Bay. Due to the failure of the fish pass at the ASLC to attract returning adults we have adjusted our plans for recapturing returning adults from the 1999 cohort to include sampling in upper Resurrection Bay.

COMMUNITY INVOLVEMENT

This is a specialized project that will not benefit directly from the knowledge of local/traditional people. We will hire local residents when possible for assistance (e.g., collecting and maintaining fish). We have developed two computer interactive educational games to be incorporated in displays describing our project at the ASLC ("Lost Child" and "Whose Your Father?"). Amy Haddow, ASLC Education Director, is currently developing a display based upon these games. In addition, we have taken opportunities to explain our research in different Alaska high schools. Kathy Knudsen gave a presentation on this project to the freshman biology class at Kenai High School, and Kate Lindner discussed this study with high school students in Kongiganak.

We are attempting to involve the community of Seward in our project and different aspects of the study such as collecting the returning adults. A lottery was conducted during the 2000 field

season as an incentive to recreational fisherman to turn in any marked pink salmon they caught. This resulted in 18 recreational fishermen turning in 22 marked fish. We are also interested in suggestions of other opportunities for informational meetings in the communities of Prince William Sound, and articles in the Trustee Council newsletter.

PROJECT DESIGN

A. Objectives

Our initial primary objective was to construct a detailed genetic linkage map for pink salmon by analyzing the genetic transmission of several hundred DNA polymorphisms. Pink salmon have 26 pairs of chromosomes (2N=52; Allendorf and Thorgaard 1984), and, therefore, should have a total of 27 linkage-groups: 25 autosomes, an X-chromosome, and a Y-chromosome. We planned to map enough variable markers so that a new marker can be assigned with high probability to one of the 27 linkage groups. It was impossible to know how many markers this would require because we did not know the total length of the pink salmon linkage map. The linkage map of the zebrafish (*Danio rerio*) has been estimated to be 2900 centimorgans (cM; Johnson et al. 1996) and that of the medaka (*Oryzias latipes*) to be 2480 cM (Wada et al. 1995). There currently are efforts to include zebrafish among genome projects of model species sponsored by the National Institutes of Health under the Human Genome Project (Roush 1997). Such a massive effort in zebrafish would provide extremely helpful information for understanding the genome of salmonid fishes.

We expected the pink salmon map to be large because of the polyploid ancestry of salmonids and due to the fact it is female based. Young et al. (1998) recently have published a rainbow trout (*Oncorhynchus mykiss*) linkage map based upon recombination rates in males and estimated the total map to be 2628 cM. However, the linkage map in males will be shorter than in females because of the reduced recombination rate in male salmonids (Johnson et al. 1987a). We initially anticipated that it would be necessary to map over 500 markers to ensure that new markers can be assigned to an existing linkage group with high probability (Van der Beek and Van Arendonk 1993). For example, 99% of all loci in the zebrafish were estimated to be located within 20 cM of a marker on the map based upon an earlier report using 414 markers (Postlethwait et al. 1994).

This project originally had the following overall specific objectives:

- 1. Develop several hundred variable DNA markers in pink salmon and test them for Mendelian inheritance.
- 2. Construct a linkage map based upon joint segregation patterns of the DNA polymorphisms detected in previous objective.
- 3. Map putative lesions identified in Restoration Study \191A.
- 4. Test for Mendelian inheritance of markers throughout the genome in progeny of fish exposed to oil. Regions that show aberrant segregation ratios in progeny of fish exposed to oil and

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normal 1:1 ratios in fish not exposed to oil would be candidates for oil-induced lesions.

- 5. Test for regions of the genome that are associated with traits of adaptive significance (e.g., marine mortality or run-timing).
- 6. Test if protein markers (allozymes) are under natural selection such that they may not provide accurate information about the genetic structure and amount of gene flow among populations.

We have completed Objectives 1 and 2. We cannot pursue Objective 3 because Restoration Study /191A did not identify any putative lesions for mapping. At present, we do not intend to pursue Objective 4 because Restoration Study \191A is no longer ongoing. However, this type of experiment to detect oil-induced lesions could be pursued in the future at the ASLC. The primary focus in FY 02 will be Objectives 5 and 6; we propose to use the linkage map to test if there are phenotypic effects and adaptive significance of different classes of molecular markers.

B. Methods

OBJECTIVES 1 & 2

Our initial map was constructed using gynogenetic haploid and gynogenetic diploid progeny from an odd-year individual female (95-103). This is the same procedure that has been used to build the zebrafish linkage map (Postlethwait et al. 1994). Stanley (1983) reported that haploid embryos of Atlantic salmon will develop until just prior to the stage of hatching if development of the eggs is activated by sperm in which the DNA has been inactivated by UV-radiation. We have used this technique routinely with fishes of the genus *Oncorhynchus* (Forbes et al. 1994; Spruell et al. 1999). This allows us to follow the segregation and linkage relationships in haploid progeny from females. The use of haploid progeny avoids possible difficulties of dominance with some types of DNA markers because recessive alleles are not obscured by their dominant alternatives in haploids (Lie et al. 1994). Our odd-year map is primarily based on 603 segregating markers in 94 haploid progeny from a single pink salmon female (A95-103) that returned to Armin F. Koernig hatchery in Prince William Sound in August 1995. We have placed a number of so-called "anchor" loci on this map.

In addition we have initiated the construction of a linkage map based on the segregation pattern of 90 haploid individuals in an even-year female (V96-13). Odd- and even-year pink salmon are reproductively isolated due to the fixed two-year life cycle of this species (Aspinwall 1974). Beacham et al. (1988) report substantial allozyme and morphological evidence for differentiation of alternate brood years. In addition, Phillips and Kapuscinski (1988) and Phillips et al. (1999) detected chromosomal rearrangements between odd- and even-year populations that occur in the same geographical area. Furthermore, in a recent experimental study, Gharrett et al. (1999) demonstrated outbreeding depression in crosses between the two year classes. Together, these finding suggest that the alternate brood years are reproductively isolated and genetically distinct. Having linkage data from both odd- and even-year individuals will make it possible to map more markers and will allow us to determine whether linkage relationships are conserved between the reproductively isolated year classes. Differences in meiosis between male and female salmonids have been found in all species that have been examined (Allendorf and Thorgaard 1984; Johnson et al. 1987a). There generally is greater recombination in females than in males (Johnson et al. 1987a; Allendorf et al. 1994). In addition, only disomic inheritance has been reported in females. However, in males some loci show patterns of segregation that approach those expected with tetrasomic inheritance (Allendorf and Thorgaard 1984). We will have to test for segregation and linkage in males as well as females because of these sex-specific differences.

Construction of a full linkage map is a large task. We developed as many time and labor saving procedures as possible. Our linkage map was constructed by computer assisted analysis (MapMaker, Lander et al. 1987). We have been assisted by Mark Daly of the Whitehead Institute at MIT in using this program. We will compare the recombination rates based upon this map to rates of selected pairs of loci in males using families produced for the 1998 cohort. The reduced recombination rates in salmonid males means that it will be easier to assign new markers to a linkage group using male parents. We will test joint segregation of individual markers from different linkage groups identified in females to determine if some of these separate linkage groups in females are linked in males and are therefore syntenic (on the same chromosome).

A useful genetic map contains genetic markers that are abundant, randomly distributed throughout the genome, highly polymorphic, and readily detectable in many laboratories (Jacob et al. 1995). We began using random amplified polymorphic DNA (RAPD) markers because they fit these criteria and they have been used successfully in constructing linkage maps in zebrafish and medaka (Johnson et al. 1996; Wada et al. 1995). We have switched to two other types of genetic markers that are superior to RAPDs in this work.

<u>PINEs</u>: There are a variety of repetitive DNA elements that are scattered throughout the genome of salmonid fishes. Greene and Seeb (1997) have described a technique that uses the sequences from a SINE (short interspersed nuclear element) and a transposon to detect many DNA polymorphisms. They have called this technique SINE-printing. We have modified this technique using other types of repetitive elements for our mapping study to detect a class of molecular markers that we call PINEs (paired interspersed nuclear elements; Spruell et al. 1999).

Kido et al. (1991) described 3 SINEs in salmonid fishes. They documented the presence of two such elements, *HpaI* and *SmaI*, in pink salmon. Spruell and Thorgaard (1996) subsequently reported the presence of the 5'-end of the third element, *FokI*, in pink salmon. Goodier and Davidson (1994) confirmed that salmonids also contain the transposon Tc1, a member of another class of repetitive elements. Both SINEs and transposons occur in high copy number and are believed to be ubiquitously dispersed throughout the genome, making them ideal candidates for genomic mapping efforts.

We have used DNA sequences from four types of repetitive elements as polymerase chain reaction (PCR) primers to generate multiple DNA fragments from a single PCR reaction in pink salmon. The theoretical basis for this procedure is similar to the use of the human SINE *Alu*I to identify human chromosomes in somatic cell hybridization experiments (Nelson et al. 1989).

Primers complementary to one end of the element are oriented such that they initiate DNA synthesis from the end of the element, progressing into the surrounding genomic DNA. A single primer or combinations of primers may be used to generate multilocus patterns. Greene and Seeb (1997) used this technique to confirm the parentage of pink salmon fry, demonstrating the potential utility of including these fragments in our mapping study. We have used 12 different pairs of PINE primers to detect 162 segregating markers in our reference family.

<u>AFLPs</u>: Amplification fragment length polymorphisms have been used extensively in the construction of genomic maps in plants (Maheswaran et al. 1997; Becker et al. 1995). The AFLP technique is especially advantageous for two reasons. First, many bands are produced per reaction and, therefore, more polymorphic loci are produced per unit effort. Second, the selective amplification step uses a subsample of the PCR products of the preamplification. Up to 133 selective amplifications can be completed from a single pre-amplification that originally used only 0.5 μ g of genomic DNA. Much less genomic DNA is needed to produce more bands than using other methods such as RAPDs. This is an important consideration when dealing with the limited amount of tissue available from haploid embryos.

Gene-Centromere Map

We estimated recombination rates between 312 loci and their centromeres using half-tetrad analysis in a recently published manuscript (Lindner et al. 2000). We produced the half-tetrads by initiating development with irradiated sperm and blocking the maternal second meiotic division. AFLPs were significantly more centromeric than loci identified by three other techniques (allozymes, microsatellites, and PINEs). The near absence of AFLPs in distal regions could limit their utility in constructing linkage maps. A large proportion of loci had *y* values approaching 1.0, indicating near complete crossover interference on many chromosome arms. As predicted from models of chromosomal evolution in salmonids, all duplicated microsatellite loci that shared alleles (isoloci) had *y* values of nearly 1.0. This is consistent with previous data from allozyme loci.

Odd-Year Linkage Map

We have described the segregation of 590 markers in haploid progeny from female A95-103; we have also mapped 13 allozyme loci in the same female (Table 1, Figure 1). We assigned 546 of the 590 markers to one of 44 linkage groups covering a distance of 4559 cM (Table 2). Given the haploid number of 26 chromosomes for pink salmon, our mapping efforts produced 18 extra linkage groups. Taking into account the extra linkage groups and 43 unassigned markers as well as the distance to the telomeres we estimate the size of the pink salmon genome to be 6691 cM. The haploid pink salmon genome is approximately 2.72 million kilobase pairs (kpb; Johnson et al 1987b); thus, we estimate approximately 406 kbp/cM. These results are consistent with our expectations when comparing to maps constructed in other fishes (Table 3).

	Number of polymorphic loci	Number of markers unlinked	Percent assigned to linkage group
AFLPs	393	36	91
PINEs	162	7	96
Microsatellites	35	0	100 .
Allozymes	13	0	100
Total	603	43	93

Table 1. Summary of Marker Types on the Odd-Year Pink Salmon Map

 Table 2.
 Summary of Odd-Year Pink Salmon Linkage Groups

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Number of Markers	Number of groups	Average size (cM)
1-5	10	23.26
6-10	14	53.51
11-15	9	118.50
16-20	6	181.27
21-25	1	189.20
26-30	1	243.70
31-35	2	263.05
36-40	0	
41-45	0	
46-50	0	
over 50	1	457.40

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[FIGURE 1 in WORD files (fig-1a.doc; fig-1b.doc; fig-1c.doc)]

[TABLE 3 in WORD file (table-3.doc)]

Putting "Anchor Loci" on the Map

We are still in the process of placing additional loci on the map to aid in consolidation and to make the map useful to other genetic investigators working with salmonids. In particular, it is important to include common markers that can serve as references between maps from divergent taxa (O'Brien et al. 1993). The primary types of so-called "anchor loci" we have used are allozymes and microsatellites that are currently being used in salmonid population genetic studies, including investigations of pink salmon. We will also map other loci that are available and of special interest and usefulness (e.g., growth hormone loci, Forbes et al. 1994, and the major histocompatibility complex, Katagiri et al. 1996; Shum et al. 1996; Miller and Withler 1998). These anchor loci will be used to test for differences in the linkage map between odd- and even-year pink salmon. In addition, we will test for differences in recombination rates, crossover interference, and residual tetrasomic inheritance between males and females (Allendorf and Danzmann 1997).

We have placed 35 microsatellite loci on the odd-year map in collaboration with Drs. Roy Danzmann, Moira Ferguson, and Takashi Sakamoto at the University of Guelph in Ontario. These microsatellite loci are found in 17 linkage groups. We have also placed 13 allozyme loci that are polymorphic in Prince William Sound pink salmon (Seeb et al. 1996; Habicht et al. 1998) on the map using gynogenetic-diploids from female A95-103 and several normal diploid families (Table 4) in collaboration with the ADFG Genetics Lab.

Table 3. Comparison of linkage maps from six teleost fishes. Total number of markers included on the map are provided. Sex refers to which gender the map is based on, F= female and M= male. The estimated size takes into account unlinked markers, distance to the telomere, and extra linkage groups. LOD (log odds) is one mapping function used to determine linkage between markers.

	Pink Salmon	Rainbow	Trout	Zebr	afish	Tilapia	Med	laka	Xiphophorus
		Sakamoto et al. 2000	Young et al. 1998	Shimoda et al. 1999	Johnson et al. 1996	Kocher et al. 1998	Naruse et al. 2000	Wada et al. 19	95 Morizot et al. 1991
Number of Markers	603	221	476	2000	652	174	634	170	76
Number of Linkage Groups	44	29	42	25	29	30	24	28	17
Number of Chromosomes	26	30	30	25	25	22	24	24	. 24
Sex	\mathbf{F}	M & F	Μ	M & F	F	F	M & F	М	M & F
Estimated size (cM)	6691	1951	2627	2295	2720	1000-1200	1443	2480	1400-2600
kbp/cM	395	1263	913	740	625	833-1000	554	323	300
LOD	4	3	3	4	3	3	3.5	3	3

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Figure 1. Genetic linkage map of odd-year pink salmon based on the inheritance of 603 polymorphic loci. Numbers to the left indicate recombination rates (cM). Locus names are to the right. Centromeres are indicated by black rectangles.

LG3

14.1

2.7

19

32

15.3

7.2

22.2

232

34.5

9.2

6.4

7.4

20.1

1.5

7.1

2.9

5.3

53

22,7

21.5

11.6

164

7.3

7,5

10.5

33

75

149

200

77

19

14.0

AGGICTANS

AAG/CAC90

AGA/OGT67

AAC/CAT219

AGGICITI355

AGGICTT174

AGG176Ac

5S/5T73

SF/5T 70

OTS 101

OTS 1 --

ACCICATE

33.642/5T 315

AGG/CTA100

AGG/CTA105

AAC/CTC240

AAC/CTC242

LG7

2115857

AGC/CAG312

AGG/CIT226

AAC/CAC395

AAC/CAC400

AGA/CAC152

AAG/CGA107

AAG/CTA267

ACC/CAC153

AGC/CAC115

ONES

9058155

33.6+2/51318

ACC/CAT120

- IDHP2





13.6 AAC/CAC210







Loci	Family	Informative Parent	N	r	Chi-sq (1 df)
sAAT3 - FH	A95-14	F	86	0.337	9.12
sAAT3 - sMDHB1,2	A95-14	F	89	0.112	53.49
sAAT4 - STR60	A95-104	F	21	0.238	5.76
ADA2 - PGDH	A95-120	М	56	0.125	31.50
ADA2 - SSA197	A95-103 A95-120	F M	42 18	0.024 0.111	38.10 10.89
CKC2 - STR60	A95-103	F	46	0.348	4.26
FH - MDHB1,2	A95-14	F	86	0.291	15.07
bGALA - G3PDH1	V96-2	М	75	0.346	7.05
GDA1 - PEPD2	A95-8 A95-20 A95-29	M M M	82 95 45	0.012 0.105 0.000	78.05 59.21 45.00
G3PDH1 - PEPLT	V96-5	Μ	75	0.240	20.28
GPIB1,2 - PEPD2	V96-2	М	75	0.013	71.05
sIDHP2 - OTS1	A95-29 A95-104	M F	41 33	0.366 0.303	2.95 5.12
PGDH - SSA197	A95-120	М	20	0.050	16.20

Table 4. Summary of linkages in normal diploid families between allozymes and microsatellites. The sex of the informative parent is given in the third column (F = female, M = male). Rate of recombination between loci is indicated by r.

Even-Year Linkage Map

We have completed initial construction of a linkage map for even-year pink salmon from Prince William Sound. We have analyzed the segregation pattern of 85 loci in an even-year family (V96-13) and assigned 63 of 85 loci to one of 22 linkage groups (Table 5, Figure 2). One gene of known function, $MHCB^{\alpha}2$, is assigned to a linkage group that consists of one microsatellite and two PINE loci (Figure 2).

Preliminary analysis has not found any differences in location of loci on the maps or recombination rates between the odd- and even-year maps. After the addition of more markers to the even year map we plan to complete the comparative analysis of the odd- and even-year maps, and submit a publication.

	Number of polymorphic loci	Number of markers unlinked	Percent assigned to linkage group
Microsatellites	19	6	68
PINEs	65	17	74
MHCB $lpha$ 2	1	0	100
Total	85	23	73

 Table 5.
 Summary of Marker Types on the Even-Year Pink Salmon Map

[FIGURE 2 in WORD file (fig-2)]

OBJECTIVES 5 & 6

The completion of a genome map for pink salmon provides important information for addressing genetic issues related to two other Components of the Pink Salmon Restoration Program. The numerous genetic markers identified in the course of this study will provide greatly increased power and resolution to identify stocks of pink salmon on a very fine scale (Stock Separation and Management). In addition, understanding the process of mutation will help identify appropriate markers for use in stock identification. The genome map also provides a platform to test for the presence of genes having major effects on traits of importance for the management of pink salmon, and to test for phenotypes associated with specific combinations of multilocus genotypes (Lander and Schork 1994). These genetic markers will be of great value in genetically identifying fish from supplementation programs (hatchery-raised stocks) and detecting their ecological and genetic interactions with wild fish (Supplementation). Figure 2. Genetic linkage map of pink salmon based on the inheritance of 85 polymorphic loci in one even-year family (V96-13). Numbers to the left indicate recombination rates (cM). Locus names are to the right.



This aspect of the research is being performed at the ASLC research facilities. Approximately 50,000 and 24,000 marked fish were released in spring of 1999 and 2000 respectively. We will collect surviving individuals when they return to upper Resurrection Bay at sexual maturity. A sample of the fish were collected at release and will be analyzed so that their genetic characteristics prior to the marine phase of the life cycle can be compared to the returning adults. We will test for genetic effects on phenotypes of special importance by comparing the genotypes of the released fish with the genotypes of the returning fish. This will allow us to test for genes with a major effect on marine survival. We will test for loci or regions of the genome that have a large effect on phenotypes of interest, so-called quantitative trait loci (QTL's). For example, Jackson et al. (1998) recently have presented evidence for QTL's that affect upper temperature tolerance in rainbow trout linked to two of 24 polymorphic loci that they examined. Mousseau et al. (1998) have used a similar approach to estimate heritabilities for weight, length, and age at sexual maturation in chinook salmon.

Previous work has demonstrated genetic differences in run-timing has a genetic basis (McGregor et al. 1998; Smoker et al. manuscript). We will compare the genotypes of fish returning to the facility at different times to test for genes with a major effect on run timing. We will use a suite of genetic markers spread uniformly throughout the genome. Regions of the genome that show major associations with run-timing can then be examined in more detail by comparing additional markers within that region. A similar approach using only 10 protein markers in hatchery rainbow trout revealed several regions of the genome associated with time of spawning (Leary et al. 1989). Sakamoto et al. (1999) have reported similar results on the basis of 54 microsatellite loci.

Karl and Avise (1992) reported concordant patterns of genetic differentiation for mitochondrial DNA and four nuclear DNA loci in the American oyster (*Crassostrea virginica*) along the east coast of North America. In contrast, previous allozyme studies had not detected these genetic differences among these same populations. Karl and Avise concluded that the pattern observed for the DNA markers reflected the historical patterns of isolation and gene flow among these populations while this pattern is obscured in the allozymes because of "balancing selection" at the allozyme loci. Similar results have been reported in the Atlantic cod (Pogson et al. 1995). These results provide an important challenge to the generally accepted utility of allozyme markers for describing historical patterns and amounts of gene flow between populations. That is, if allozymes are under strong natural selection then they may not provide accurate information about the genetic structure and amount of gene flow among populations.

Restoration Projects 95320D and 96196 have described the genetic population structure in Prince William Sound (PWS) odd- and even-year fish at allozyme loci and mitochondrial DNA (mtDNA) (Seeb et al 1996; Habicht et al. 1998). These studies reported small but statistically significant genetic allele frequency differences among streams, and concluded that pink salmon in PWS should be managed taking into account subpopulation structure rather than as a single panmictic population. As is usually done in such studies, these authors assumed that the genes they examined were selectively neutral (that is, not affected by natural selection). However, the estimates of these authors could be severe overestimates of the actual amount of gene flow if "balancing" selection is maintaining similar frequencies (Karl and Avise 1992; Pogson et al.

1995). That is, there may be much less gene flow among populations than is suggested by these studies.

Zhivotovsky et al. (1994) have reviewed population genetic data of pink salmon and concluded that the interpretations concerning amounts and patterns of gene flow are questionable because even weak natural selection could have a major effect on genetic divergence among populations of pink salmon. A series of papers by Altukhov and his colleagues has provided evidence for phenotypic and fitness effects of genetic variation at allozyme loci in pink salmon (Altukhov 1990; Altukhov et al. 1987, 1989; Dubrova et al. 1995; Kartavtsev 1992). These papers argue that genotypes at allozyme loci have a significant effect on marine survival, growth rate, and several other important factors.

The clearest and perhaps most important effects have been demonstrated on marine survival and growth rates. Pink salmon that are more heterozygous at allozyme loci have greater viability and growth rates than more homozygous individuals (Altukhov et al. 1991; Zhivotovsky et al. 1987; Kartavtsev 1992). Table 6 shows the distribution of individual heterozygosities at four allozyme loci in fry before release into salt water and returning adult spawners in odd-year pink salmon from the Sakhalin Island (Altukhov et al. 1987). We would expect the heterozygosities in fry and adults to be similar if the genotypes at these loci are not associated with survival. The significantly higher heterozygosity in the returning adults (0.619) than in the fry (0.424) indicates that individuals that were more heterozygous at the four loci had greater marine survival.

Altukhov et al. (1991) found a significant positive regression (r=0.14; P<0.01) between individual heterozygosity at these same four allozyme loci and body length of fry immediately preceding downstream migration from a hatchery on the Sakhalin Island. Kartavtsev (1992) reported a similar relationship in a different experiment with pink salmon from Sakhalin island (r=0.23; P<0.001). Previous studies with salmonids have found that size has an important effect on survival (Hunt 1969).

	Number	of heterozyg	_	
Age-class	0	1	2-4	Average Heterozygosity
Fry	0.620	0.336	0.044	0.424
	(559)	(302)	(40)	(901)
Adults	0.495	0.391	0.144	0.619
	(300)	(237)	(69)	(606)

Table 6. Distribution of Heterozygosity at Four Allozyme Loci in Pink Salmon from Sakhalin

 Island

* values are the frequencies (and number) of individuals with the indicated number of heterozygous loci.

Similar results have been reported in other salmonid species for many phenotypes of evolutionary importance (e.g., developmental rate, egg size, and disease resistance; reviewed by Ferguson 1992). Positive associations between heterozygosity at allozyme loci and important phenotypic characters, such as growth rate, survival, fertility, disease resistance, developmental rate, and developmental stability, have been described in many organisms (reviewed by Zouros and Foltz 1986; Allendorf and Leary 1986).

The mechanism underlying these associations remains unknown. The most likely explanations are (1) the associations are the consequence of heterozygosity at the loci examined, or (2) the loci examined may be in linkage disequilibrium with other loci that affect the traits being studied (associative overdominance; Leary et al. 1987).

It has been argued that these relationships between multiple locus heterozygosity and phenotypes have been found with allozymes because these loci are important in ATP production and protein catabolism (Koehn et al. 1988). We propose to distinguish between these hypotheses by using the linkage map to compare the effects of different markers on marine survival and other traits. If the enzyme loci themselves are responsible for this effect, then we would expect to find an association between enzyme genotypes and survival, but not between genotypes at DNA markers spread throughout the nuclear genome. However, if we find a similar association using DNA markers, this would suggest that the effect is due to chromosomal segments and not the enzyme loci themselves.

We believe that it is unlikely that the enzyme loci themselves are responsible for the observed

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relationships. Nevertheless, regardless of the underlying mechanisms of these associations, even weak heterozygous advantage (or associative overdominance) would act to maintain similar allele frequencies in different populations in the absence of significant gene flow (Allendorf 1983). This could cause a large overestimation of the actual amount of gene flow among Prince William Sound pink salmon populations. For example, just a 10% selective advantage of heterozygotes will cause a 10-fold over estimation of the amount of migration in the case where local populations have an effective size of 100 and an average 0.5 migrants per generation (Allendorf 1983). Altukhov et al. (1987) have estimated an average selective advantage of approximately 25% at four allozyme loci in pink salmon.

We will ask a series of questions in this aspect of the research. The primary question is are there regions of the genome that have a significant effect on survival during the marine phase of the life cycle? Secondarily, we will ask if allozyme markers tend to occur in those regions that affect survival. We will also determine if selection favors heterozygotes.

Marine Survival and Fitness Experiment: 1998 cohort

In August 1998, 150 (75 male and 75 female) mature pink salmon were collected from Likes Creek, Resurrection Bay, and transported to the ASLC for controlled matings. We made 75 families of full-sibs by crossing one male and one female. One hundred progeny from each family were collected to test marker inheritance for parentage analysis. We then selected 50 of these families on the basis of egg number and survival during incubation for the release experiment. These families were pooled together into a single tank in March shortly after hatching. In May 1999, approximately 1,500 progeny from each of these 50 single-pair mating families were marked and released from the ASLC facility.

Progeny from this experiment returned in August 2000. We had anticipated a return rate of 2%, for a total of 1,000-2,000 individuals expected to be recovered for genetic and morphological analyses (approximately 30 fish per family). However, no fish returned to the ASLC fish pass. We did capture a total of 36 fish from 30 families throughout Resurrection Bay (Table 7, Figure 3). Based on the number of fish collected with our limited resources it is clear that a large number of marked fish did survive and returned to Resurrection Bay. We were not able to achieve any of our objectives with this small number of fish. It is interesting to note, however, that fish from the same family did tend to return at the same time, indicating a genetic component to time of return (Table 7).

[TABLE 7 in WORD file (table-7.doc)]

[FIGURE 3 in WORD file (fig-3.doc)]

Marine Survival and Fitness Experiment: 1999 cohort

We repeated this experiment with odd-year pink salmon in August 1999. We collected 68 adults (34 females and 34 males) from Likes Creek, and released their marked progeny from the

Figure 3. Nautical map of upper Resurrection Bay. Circles indicate where marked pink salmon determined to be part of our study were collected in August and September 2000. Arrow indicates the location of the Alaska SeaLife Center.



Individual #	Sex	Date Collected	Location	Length	
individual n	DUR	Dute Contocted	Boouton	(mm)	Family #
1	F	August 7	Culvert	480	73
2	Μ	August 7	Culvert	490	46
3	М	August 15	Lowell Cr.	478	11
4	Μ	August 15	Harbor	478	61
5	F	August 16	Lowell Cr.	441	69
6	Μ	August 16	Spring Cr.	430	6
7	F	August 17	Culvert	444	27
8	М	August 17	Culvert	473	50
9	М	August 17	Culvert	510	72
10	Μ	August 17	Harbor	496	23
11	F	August 18	Spring Cr.	457	63
12	F	August 18	Culvert	456	74
13	М	August 18	Spring Cr.	467	28
14	Μ	August 18	Culvert	435	9
15	Μ	August 21	Spring Cr.	437	73
16	F	August 22	Culvert	446	49
17	F	August 22	Resurrection R.	484	19
18	F	August 22	Spring Cr.	475	25
19	F	August 22	Resurrection R.	457	38
20	М	August 22	Resurrection R.	418	12
21	F	August 23	Resurrection R.	475	19
22	F	August 24	Culvert	458	15
23	F	August 24	Harbor	483	58
24	М	August 24	Harbor	447	7
25	F	August 25	Resurrection R.	466	75
26	F	August 25	Resurrection R.	470	75
27	Μ	August 25	Spring Cr.	397	53
28	М	August 25	Culvert	478	64
29	М	August 27	Culvert	508	23
30	F	August 28	Harbor	475	49
31	F	August 28	Resurrection R.	519	45
32	М	August 28	Resurrection R.	473	40
33	Μ	August 29	Harbor	470	41
34	F	August 30	Spring Cr.	499	45
35	F	August 30	Spring Cr.	470	21
36	F	September 2	Culvert	466	51

Table 7. Summary of adult marked pink salmon collected from freshwater streams in upper Resurrection Bay. Sex is abreviated, F = female and M = male. Each individual was assigned back into its family of origin as reported in the last column.

ASLC in May 2000. This cohort should return in the summer of 2001. We used a different experimental mating scheme with these fish to allow a more powerful genetic analysis of the progeny. Each male and each female was crossed with two individuals in a series of 2 x 2 diallele crosses (Figure 4). Based on results from 2000, we do not expect our fish to return to the ASLC. Therefore, we are planning a more extensive survey of freshwater streams in upper Resurrection Bay.

[FIGURE 4 in WORD file (fig-4.doc)]

Mutation Analysis

Our results have provided exciting and important information about mutation processes in microsatellites which we have described in a manuscript for submission to the journal Molecular Biology and Evolution. Our experimental design depends upon being able to place returning adults into their correct family on the basis of their multiple-locus genotypes. We tested this by examining inheritance data at 11 loci (nine microsatellites and two genes of known function) for 10 progeny from each of the 50 families that were released in spring of 1999. In the process of analyzing the inheritance data, we detected several mutations at two of the microsatellite loci (*SSA408* and *OGO1c*), indicating that these loci have particularly high mutation rates. Furthermore, at *SSA408* the mutations detected were not distributed randomly among families. Rather, clusters of identical mutant alleles were found in certain families, suggesting they may have resulted from mutation events occurring very early in gametogenesis, prior to meiosis.

To further evaluate mutation rates and patterns, we genotyped 35-40 progeny from each of five of the 1998 cohort families at the nine microsatellite loci included in the initial inheritance analysis (Table 8). We combined the data for these progeny and the initial inheritance data for estimation of mutation rates. Sixteen of the individuals in this dataset have genotypes best explained as resulting from mutation events (Table 9a). Five of the mutations were at *OGO1c* and 11 were at *SSA408*. Because each individual inherits two copies of each gene, we estimated mutation rates as the number of mutations/two times the number of individuals genotyped. The resulting mutation rate estimates at *SSA408* and *OGO1c* are 8.5×10^{-3} and 3.7×10^{-3} respectively (Table 8). No mutations were detected at any of the other seven loci, indicating that their mutation rates are lower than could be detected with our data.

[TABLE 8 in WORD (table 8.doc)]

[TABLE 9 in WORD (table 9.doc)]

We also analyzed additional progeny from the two families which had several individuals with identical mutations at *SSA408* in the initial inheritance study. Two more mutant individuals were detected in 36 additional progeny sampled from family 98-23 and five were found in 40 additional progeny from family 98-26 (Table 9b). The fact that the same mutant allele at *SSA408* was transmitted to a total of nine of 50 embryos from family 98-26 and similarly to four of 46 embryos in family 98-23 (Table 10) strongly suggests that these are premeiotic cluster mutations. In sexually reproducing nimals, gametes develop from primordial germ cells (PGCs) that differentiate from the somatic cells

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Figure 4. Diagram of our half-sib family experimental design. Numbers across the top represent females, numbers down the side represent males. The squares represent individuals used to make each family.

	FEMALES									
		01	02	03	04	05	06		33	34
	101	01x101	02x101							
	102	01x102	02x102			_				
	103			03x103	04x103					
MALES	104			03x104	04x104					
	105					05x105	06x105			
	106					05x106	06x106			
	-							•		
								•		
	•							•		
	1.33								33x133	34 _x 133
	134								33x134	34x134

Table 8. Microsatellite loci amplified in 50 full-sib families of pink salmon produced in
1998. Number of alleles and expected heterozygosity (He) are based on the parental
population. Mutation rate estimates are calculated as the number of mutant alleles
detected divided by the total number of alleles analyzed (see text).

Locus	Number of Alleles	H _e	Mutation Rate
OGO1c	77	0.983	3.7 x 10 ⁻³
<i>OGO</i> 8	17	0.334	0.0
OMY301	21	0.856	0.0
OMYRGT6	18	0.922	0.0
ONE ₁₁ 3	3	0.507	0.0
OTSÍ	15	0.829	0.0
SSA20.19-1*	2	0.058	0.0
SSA20.19-2*	3	0.307	0.0
SSA408	49	0.972	8.5 x 10 ⁻³

* Multiple allelic banding patterns and the sequences of these bands in *O. gorbuscha* (unpublished data) indicates that *SSA20.19* is a duplicated locus.

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Table 9. Mutations observed at two microsatellite loci; a) data from the initial inheritance study with additional progeny from five randomly selected families (see text); b) data for families 98-23 and 98-26 (includes results from 9a).

a)					
SSA408:			OGO1c:		
Family	<u># Individuals</u>	# Mutants	Family	<u># Individuals</u>	<u># Mutants</u>
98-15	46	1	98-44	9	1
98-19	46	1	98-51	10	1
98-22	9	1	98-64	10	1
98-23	10	3	98-71	44	2
98-26	10	4	46 others	566	0
98-34	46	1			
44 others	483	0	TOTAL:	668	5
TOTAL:	650	11			

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SSA408:		
<u>Family</u>	<u># Individuals</u>	<u># Mutants</u>
98-23 98-26	46 50	5 9
TOTAL:	96	14

very early in development. These cells eventually migrate to the area of the developing gonads where the germ cells are produced. The number of PGCs produced varies widely among organisms (reviewed by Matova and Cooley 2001). In zebrafish (*Danio rerio*), researchers combining morphological and mRNA expression studies using germ line markers have recently determined that by the 5-somite (32cell) stage and until about the 1000 cell stage there are four PGCs (Braat et al. 1999). During their migration towards the gonads the four PGCs give rise to 20-30 cells that populate the gonad and differentiate into germ cells (Braat et al. 1999). In theory, if there is a mutation in one of the original four PGCs, approximately one out of eight (12.5%) of the progeny should inherit the mutant allele. Assuming gametogenesis is similar in pink salmon, our findings of nine identical mutant alleles out of the 50 transmitted maternally (18%) in family 98-26 and four of 46 identical mutant alleles (8.7%) transmitted paternally in family 98-23 suggest that each of these mutations likely occurred either in one of the four PGCs or in the subsequent one or two generations of cells that populated the gonad.

[TABLE 10 in WORD (table 10.doc)]

The occurrence of clustered mutations results in non-uniform distributions of novel alleles in a population which, if not identified as such, could influence interpretations of mutation rates and patterns as well as interpretations of patterns of genetic population structure. Woodruff et al. (1996) have shown that mutant alleles that are part of clusters are more likely to persist and be fixed in a population than mutant alleles entering the population independently. In the present study, 13 of the 23 mutant alleles detected (57%) apparently resulted from premeiotic mutations. Jones et al. (1999) similarly found that a high proportion (40%) of new mutants observed in pipefish (*Sygnathus typhle*) occurred in mutational clusters. No other published accounts of cluster mutations in fish microsatellites were found, however hese results are similar to the estimates from *Drosophila* of 20-50% reported by Woodruff et al. (1996).

Microsatellite mutations are generally thought to result from DNA polymerase strand slippage (Levinson and Gutman 1987, Weber and Wong 1993). Recent evidence indicates there is a tendency towards upward biases in size change (Amos et al. 1996, Primmer et al. 1996, Wierdl et al 1997). To evaluate whether the mutations we detected reflected size increases or decreases, we assumed the progenitor of the mutant allele was the parental allele that was closest in size (Table 10). Assuming single mutation events account for the mutation clusters at *SSA408* in families 98-23 and 98-26, six of the seven mutant alleles detected involved size increases of four bases. At *OGO1c* three of the five mutations detected resulted in size increases of four bases and two resulted in size decreases of four bases. All of these changes are consistent with single repeat unit addition or deletion mutations at both loci with a bias towards increasing the number of repeats at *SSA408*. Banks et al. (1999) similarly found that the single mutation in their study of the inheritance of microsatellites in chinook salmon was a gain of a single repeat-unit.

These results have important significance for the use of microsatellite loci in management. Mutations are expected to have a substantial effect on the amount and pattern of genetic divergence among populations if the mutation rate approaches the rate of migration among populations (see discussion in Allendorf and Seeb 2000). Not surprisingly, the number of mutations detected was correlated with the number of alleles in the sample (Table 8). We detected mutations at the two loci that have the greatest number of alleles in the parental population (*OGO1c* and *SSA408*, Table 8). The nutation rate estimates at *OGO1c* and *SSA408* ($3.7x10^{-3}$ and $5.4x10^{-3}$) are at the high end of the range of

Locus	Family	Dam	Sire	Pro	Progeny Genotypes				Total
		a/b	c/d	a/c	a/d	b/c	b/d	genotypes not matching parents (#)	
SSA408	98-15	334/382	322/ <u>370</u>	14	9	9	13	<i>334/374</i> (1)	46
	98-19	<u>338</u> /350	378/404	15	12	8	10	342 /404 (1)	46
	98-22	334/404	<u>350</u> /366	4	1	1	2	<i>334/354</i> (1)	9
	98-23	326/382	<u>366</u> /386	7	17	8	7	<i>326/370</i> (1) <i>382/370</i> (3) <i>326/362</i> (1)	44
	98-26	<u>316</u> /404	312/450	9	12	12	8	320 /450 (4) 320 /312 (5)	50
	98-34	354/386	370/ <u>440</u>	12	10	6	17	354/ 444 (1)	46
OGO1c	98- 44	342/350	408/ <u>474</u>	1	1	3	3	<i>342/</i> 478 (1)	9
	98-51	295/366	303/ <u>362</u>	1	2	4	2	<i>295/366</i> (1)	10
	98-71	269/420	346/ <u>450</u>	8	16	10	8	<i>420/446</i> (2)	. 44
	98-64	<i>a/a</i> 348/348	<i>c/d</i> 309/ <u>448</u>	5	4	0	0	<i>348/444</i> (1)	10

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Table 10. Mutations observed in 1998 cohort families. Parental genotypes are reported with the most likely progenitor of the mutant allele underlined. Progeny genotypes are summarized with the mutant allele in bold followed by the number observed (n).

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10⁻³ to 10⁻⁶ reported for other organisms (Dallas 1992, Weber and Wong 1993, Schug et al. 1997). The variability of these two loci makes them powerful tools for assigning parentage. We were able to unambiguously assign parentage to 35 of the 36 returning fish from the 1998 cohort based on these two loci alone. However, given the high probability of mutation at these loci, our results indicate that it is important to use a combination of low and high variability markers for parentage analysis. Our mutation analysis also suggests that *OGO1c* and *SSA408* are inappropriate as markers for analysis of stock structure in pink salmon.

C. Cooperating Agencies, Contracts, and Other Agency Assistance

The ADFG Genetics Lab is no longer funded to assist us in the work at the ASLC. Therefore, we are currently doing all of the allozyme analysis at the University of Montana.

SCHEDULE

- A. Measurable Project Tasks for FY 02 (1 Oct 01 30 Sep 02)
- 1 Oct 01 31 Dec 01: Complete genetic analyses of fry from 1999 cohort sampled at time of release from the ASLC.
- 1 Oct 01 31 Dec 01: Perform morphological analysis of returning adults from 1999 cohort.
- 1 Oct 01 31 July 02: Perform genetic analyses of returning adults from 1999 cohort.
- 1 Dec 01 30 Sep 02: Perform data analysis to test for correlations between markers from the linkage map and traits associated with marine survival and fitness in the returns of the 1999 cohort.
- 1 Oct 01 1 Mar 02: Add markers to the even-year linkage map.
- 1 Jan 02 30 Sep 02: Prepare manuscript for publication describing results of marine survival and fitness experiment.
- 1 Mar 02 30 Sep 02: Prepare manuscript for publication comparing odd- and even-year linkage maps.

B. Project Milestones and Endpoints

- Objective 1: This objective has been completed.
- Objective 2: This objective has been completed.
- Objective 3: This objective will not be pursued.

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Objective 4: This objective will not be pursued.

Objective 5: This objective will be completed by the end of year 8.

Objective 6: This objective will be completed by the end of year 8.

C. Completion Date

We initially proposed to continue this work for five years. However, our release experiments were delayed until the ASLC facilities were available. The 1998 cohort fish released in the spring of 1999 returned at the end of year five, and the 1999 cohort fish will return at the end of year six. Genetic analysis should be completed by the end of year seven and data analysis and publications completed by the end of year eight.

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Lindner, K.R., P. Spruell, C. Habicht, J. E. Seeb, H. Zhao, and F. W. Allendorf. In preparation. Estimation of chiasma interference and construction of a linkage map for pink salmon. To be submitted to Genetics.

PROFESSIONAL CONFERENCES

We anticipate presenting our results at professional and scientific meetings.

COORDINATION AND INTEGRATION OF RESTORATION EFFORT

This work has been done in collaboration with James E. Seeb, Principal Geneticist, ADFG. The inheritance experiments were performed in coordination with the project Oil-Related Embryo Mortalities (Restoration Study \191A). Dr. Seeb is no longer funded to collaborate with us in this Restoration Study.

This work is related to my ongoing genetic research with salmonid fishes that has been supported by the National Science Foundation since 1980. Many of the techniques and approaches proposed here are based upon the results of that research. I also intend to continue seeking support from NSF that will complement the research proposed here. A genetic map for pink salmon will allow us to address a number of fundamental questions in the conservation and genetics of pink salmon and other *Oncorhynchus* species.

EXPLANATION OF CHANGES IN CONTINUING PROJECTS

The changes in this proposal reflect the discontinuation of Restoration Study \191A, and the decision not to fund our ADFG collaborators on this project. We have made changes in our plans to capture fish returning to Resurrection Bay based upon the lack of any returns to the ASLC in summer 2000.

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22 (pages 23-37 are PI'S C.V., available from R.O. upon request.

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FY 02 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET October 1, 2001 ____tember 30, 2002

		Authorized	Proposed						
Budget Category	y:	FY 2001	FY 2002						
Personnel		\$132.0	\$03.7						
Travel		\$12.0	\$ <u>1</u> .7						
Contractual		\$0.0	\$0.0						
Commodities		\$35.5	\$29.7						
Equipment		\$0.0	\$0.0	kan in ander stand and the second second		RANGE FUN	DING REQUI	REMENTS	andana ing kana kana kana kana kana sa
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FY 02 EXXON VALDEZ TRUS COUNCIL PROJECT BUDGET

October 1, 2001 ___ptember 30, 2002

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	K Lindner		Research Specialist	这些教学	12.0	3.9		46.8
	K Knudsen		Research Specialist		3.0	4.4		13,2
	M Skinner		Research Specialist		3.0	3.0		9.0
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FY 02 EXXON VALDEZ TRUS

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October 1, 2001 ____tember 30, 2002

Contractual Costs:		Proposed
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Commodities Costs:		Proposed
Description		FY 2002
Materials and supplies for microsatellite, allozyme, and morphological analysis		16 (
FMBIO fluorescent scanner service and maintenance contract		7.7
Equipment repair and maintenance		5.5
Communications		0.8
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