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Exxon Valdez Oil Spill Trustee Council
Restoration Office
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To: The Trustee Council

Subject: Table of 1993 Idea Submissions

Thru: David Gibbons,
Acting Administrative Director
Restoration Team

From: Jerome Montague, Chairman
1993 Work Plan Work Group

On Behalf of: The Restoration Team

The table which follows lists the ideas submitted for the 1993 Work Plan by both the trustee agencies and the public. These ideas are divided into major categories and types. The Restoration Team is reviewing all ideas this week. In order that you receive these in advance of the Trustee Council meeting on July 20, the recommendations of the Restoration Team are not included.

Often the same or similar ideas were submitted by different individuals or agencies. One submission has been chosen to represent the rest with the appropriate lead agency and cost. The duplicate ideas do not show a dollar figure in order to calculate an accurate total when the costs of different projects are summed within categories and for all categories. Only those projects which meet the Restoration Team's initial project review conducted this week will be given to the designated lead agencies for development of a 3-page project description. Inclusion in this version of this table does not indicate support by the Restoration Team or by any Trustee agency, but is simply to provide you with the range and scope of ideas submitted.

The cost of implementing the several hundred project ideas submitted is estimated to be more than $600 million. The Restoration Team is trying to reduce the number of ideas for which funding will be considered by eliminating those which clearly cannot be funded by civil settlement monies, and those for which completed damage assessment reports are required with existing funding. In the absence of a completed and Trustee Council approved Restoration Plan, the Restoration Team is also trying to avoid funding this year those projects for which a major financial or time commitment is required unless those projects are also time critical or for which an important restoration opportunity will be lost if not performed this year. The table which follows represents the list before it was reduced by applying these criteria, though the Restoration Team will make their reduction using them by the 20th. Even meeting these criteria does not mean that a project will ultimately receive a positive recommendation for funding. Those which meet the criteria will be prioritized based upon the 3-page proposals submitted and a total 1993 Work Plan budget will be submitted within the range of available funds.

Category	No. of Ideas Submitted	Costs (Millions)
Damage Assessment	12	$ 3.7
Management Actions	105	146.0
Manipulation and Enhancement	122	59.7
Habitat Protection & Acquis.	42	257.3
Restoration Monitoring	91	27.7
Technical Support	55	106.0
Total	427	600.3

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Exxon Valdez Res[illegible]tion 1993
Project [illegible]as
sorted by [illegible]ategory

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Damage Assessment	Coastal Habitat	920610229. 3	coastal habitat injury assessment - intertidal algae	USDA	620.
Damage Assessment	Ecosystem	920612235. 1	cook inlet comprehensive monitoring program	NOAA	800.
Damage Assessment	Fish/Shellfish	920605128. 1	sockeye salmon overescapement studies	ADFG	583.
Damage Assessment	Fish/Shellfish	920610231. 2	PWS herring egg loss survey. Same as 920615297-2	ADFG	90.
Damage Assessment	Fish/Shellfish	920611234.	herring embryo viability evaluation - natural and catastrophic effects	ADFG	189.
Damage Assessment	Fish/Shellfish	920615258. 3	injury to salmon eggs and pre-emergent fry in pws, laboratory verification	ADFG	141.
Damage Assessment	Fish/Shellfish	920615297. 2	pws herring egg loss survey	ADFG	99.
Damage Assessment	Fish/Shellfish	920615297. 32	sockeye salmon overescapement	ADFG	641.
Damage Assessment	Fish/Shellfish	920615297. 33	genetic risk assessment of injured salmonids	ADFG	408.
Damage Assessment	Marine Mammals	920526033. 1	humpback whale project	NOAA	50.
Damage Assessment	Sub-Tidal	920610230. 2	experimental studies of interaction between subtidal epifaunal invertebrates	ADFG	90.
Damage Assessment	Terestrial Mammals	920604104. 2	long-term epidemiology study of oil spill workers	ADEC	0.

Total number of ideas for category: 12 Total cost of ideas (in thousands) for Category: 3711.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Management Actions	Archaeology	920526031. 1	study of petroleum hydrocarbon spectra at selected sites	ADNR	0.
Management Actions	Archaeology	920601051. 3	public education and interpretation of archaeaological resources in state parks - train park rangers	DOA/USFS	0.
Management Actions	Archaeology	920601058. 9	native museum and cultural center, kodiak	ADNR	5000.
Management Actions	Archaeology	920615273. 6	coastal archaeological inventory and evaluation of archaeological, sites kenai and katmai natl parks.	ADNR	175.
Management Actions	Archaeology	920615273. 7	Coastal archaeaological inventory and evaluation of archaeaological sites - interagency	ADNR	525.
Management Actions	Archaeology	920615273. 8	Site-specific archaeaological restoration - interagency	DOI	300.
Management Actions	Archaeology	920615273. 10	Archaeaological site protection-public education-interagency	DOA\USFS	150.
Management Actions	Archaeology	920615273. 11	Archaeaological site protection-public education-national park service	DOA/USFS	55.
Management Actions	Archaeology	920615273. 14	Archaeaological site stewardship program	ADNR	27.
Management Actions	Archaeology	920615279. 27	Archaeaological outreach-curator position.	DOA	60.
Management Actions	Archaeology	920615279. 28	alutiiq museum and culture center-phase I construction	ADNR	5000.
Management Actions	Archaeology	920615279. 31	Archaeaological site inventory and assessment.	ADNR	250.
Management Actions	Archaeology	920615296. 3	public education in spill area archaeaology	ADNR	125.
Management Actions	Archaeology	920615296. 4	achaeaological site stewardship - homer and kodiak	DOI\USFWS	75.
Management Actions	Archaeology	920615296. 5	Archaeaological restoration-regional Archaeaological planning	ADNR	170.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Management Actions	Archaeology	920615298. 17	nuchek heritage interpretive center	USDA	3000.
Management Actions	Archaeology	920615298. 18	vandalized cultural resources--inventory, evaluation, interpretation	USDA	400.
Management Actions	Archaeology	920615298. 19	pws landmarks--evaluation and interpretation	USDA	400.
Management Actions	Archaeology	920615298. 20	PWS site stewardship program	USDA	12.
Management Actions	Archaeology	920615298. 21	chugach natural forest heritage interpretive centers	USDA	12000.
Management Actions	Archaeology	920615298. 22	passports in time--cultural resource patterns in pws	DOI/UWFS	230.
Management Actions	Birds	920611233. 3	identification of seabird feeding areas from remotely sensed data and impact on restoration	DOI/USFWS	48.
Management Actions	Birds	920615273. 31	Development of managment strategies for enhancing recovery rate of birds and sea otter populations	DOI/USFWS	50.
Management Actions	Birds	920615297. 30	develop harvest guidelines to aid restoration of injured terrestrial mammals and seaducks	ADFG	99.
Management Actions	Ecosystem	920622326. 4	testing of patch-response patch dependence hypothesis-testing of an ecosystem model	NOAA	488.
Management Actions	Education	920514009.	Same as 920605137	NOAA	0.
Management Actions	Education	920514013.	Same as 920605137	NOAA	0.
Management Actions	Education	920527042. 1	Same as 920605137	NOAA	0.
Management Actions	Education	920601050. 11	maritime wing valdez museum	ADNR	150.
Management Actions	Education	920601058. 12	public education/interpretation of archaeological resources in state parks	ADNR	0.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Management Actions	Education	920601064. 1	cordova environmental reporter	USDA	83.
Management Actions	Education	920604104. 1	develop user friendly synopsis of oil spill information	USDA	0.
Management Actions	Education	920604114.	Map of spill area by resource	ADNR	0.
Management Actions	Education	920605137. 1	saams - alaska sealife center	NOAA	45859.
Management Actions	Education	920609219.	Same as 920605137		
Management Actions	Education	920610225. 1	fund a pws nature center	USDA	0.
Management Actions	Education	920612241.	Same as 920605137	NOAA	0.
Management Actions	Education	920612348. 4	publish and distribute brochures on damaged species	USDA	0.
Management Actions	Education	920615276.	Same as 920605137	NOAA	0.
Management Actions	Education	920615277. 1	Alaska sealife center in seward (saams). Same as 920605137	NOAA	0.
Management Actions	Education	920615279. 32	environmental learning resource center	ADNR	90.
Management Actions	Education	920615281. 1	Alaska sealife center in seward (saams). Same as 920605137	NOAA	0.
Management Actions	Education	920615282. 1	Alasa sealife center in seward (saams). Same as 920605137	NOAA	0.
Management Actions	Education	920615283. 1	Alaska sealife center in seward (saams). Same as 920605137	NOAA	0.
Management Actions	Education	920615292. 1	Alaska sea life center in seward (saams). Same as 920605137	NOAA	2080.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Management Actions	Education	920615298. 4	pws large format photographic book	USDA	100.
Management Actions	Education	920615298. 5	pws family of brochures	USDA	65.
Management Actions	Education	920615298. 6	pws family of video programs	USDA	100.
Management Actions	Education	920615298. 7	pbs program on pws	USDA	70.
Management Actions	Education	920615298. 9	pws implementation of interpretive plan	USDA	150.
Management Actions	Education	920615298. 11	pws scenic byway-- nomination and interpretive plan	USDA	70.
Management Actions	Education	920615298. 23	valdez visitors center	USDA	25.
Management Actions	Education	920615298. 25	interpretation for cruise ship visitors	USDA	15.
Management Actions	Education	920615298. 27	cordova environmental education center	USDA	15.
Management Actions	Education	920615298. 39	eyes on wildlife-injured resources and their restoration	USDA	200.
Management Actions	Education	920615298. 50	Environmental eduucation center in pws.	USDA	90.
Management Actions	Education	920616304. 1	Alaska sealife center in seward (saams). Same as 920605137	NOAA	0.
Management Actions	Education	920616309. 1	Alaska sealife center in seward (saams). Same as 920605137	NOAA	0.
Management Actions	Education	920617312. 1	valdez visitors center	USDA	850.
Management Actions	Education	920617314. 1	press release project on restoration program work	USDA	85.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Management Actions	Education	920622325.	Same as 920605137	NOAA	
Management Actions	Education	920622326. 12	cordova mini-imaginarium	USDA	63.
Management Actions	Education	920622326. 13	science of the sound- education program	USDA	53.
Management Actions	Education	920622326. 14	alaska oil spill curriculum rewrite and reprint	USDA	50.
Management Actions	Fish/Shellfish	920601058. 5	sockeye salmon escapement evaluation - ayakuluk river	ADFG	5.
Management Actions	Fish/Shellfish	920601058. 6	uganik river fish counting weir	DOI/USFWS	28.
Management Actions	Fish/Shellfish	920608185.	Kenai river sockeye salmon restoration (#53). Same as 920615297-43	ADFG	580.
Management Actions	Fish/Shellfish	920610231. 1	PWS herring spawn deposition survey. Same as 920615297-3	ADFG	210.
Management Actions	Fish/Shellfish	920612244. 1	c-lab-a system for monitoring meteorological and oceanographic variables that affect salmon growth	NOAA	1100.
Management Actions	Fish/Shellfish	920615249. 1	Enhanced management for cutthroat trout and dolly varden in pws. Same as 920615297-28	ADFG	0.
Management Actions	Fish/Shellfish	920615249. 4	sportfish biologist for cordova	ADFG	50000.
Management Actions	Fish/Shellfish	920615273. 37	survey of evos impacted native communities-subsistence	ADFG	700.
Management Actions	Fish/Shellfish	920615279. 10	ayakulik river sockeye salmon escapement evaluation	ADFG	6.
Management Actions	Fish/Shellfish	920615279. 11	uganik river fish weir	ADFG	28.
Management Actions	Fish/Shellfish	920615294. 6	chenega bay replacement subsistence resource project	USDA	50.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Management Actions	Fish/Shellfish	920615297. 1	restoration of pws rockfish and lingcod resources	ADFG	440.
Management Actions	Fish/Shellfish	920615297. 3	pws herring spawn deposition survey	ADFG	231.
Management Actions	Fish/Shellfish	920615297. 17	quality assurance for pws coded wire tagging and fish production records for improved mgmt. ability	ADFG	66.
Management Actions	Fish/Shellfish	920615297. 28	Enhanced management for Cutthroat Trout and Dolly Varden in PWS. Same as 920615249-1	ADFG	275.
Management Actions	Fish/Shellfish	920615297. 34	genetic stock identification for herring in pws	ADFG	205.
Management Actions	Fish/Shellfish	920615297. 35	genetic stock identification of kenai river sockeye for protection in mixed harvest areas	ADFG	410.
Management Actions	Fish/Shellfish	920615297. 38	coded wire tagging of wild stock pink salmon for stock identification	ADFG	990.
Management Actions	Fish/Shellfish	920615297. 39	inventory and effects of straying hatchery pink salmon on wild pink salmon populations in pws	ADFG	253.
Management Actions	Fish/Shellfish	920615297. 40	pink salmon escapement enumeration	ADFG	705.
Management Actions	Fish/Shellfish	920615297. 41	Adult tagging to determine distribution, migratory timing and rate of movement of pink salmon in pws	ADFG	495.
Management Actions	Fish/Shellfish	920615297. 42	coded wire tag recoveries from commercial catches in pws salmon fisheries	ADFG	855.
Management Actions	Fish/Shellfish	920615297. 43	kenai river sockeye salmon restoration	ADFG	640.
Management Actions	Fish/Shellfish	920615297. 44	pws spot shrimp recovery management plan	ADFG	715.
Management Actions	Fish/Shellfish	920615297. 46	juvenile spot shrimp habitat	ADFG	110.
Management Actions	Fish/Shellfish	920615297. 47	intertidal/shallow subtidal crustacean (decapod) composition	ADFG	275.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Management Actions	Fish/Shellfish	920615297. 74	otolith mass marking as an inseason stock separation tool to reduce wild stock salmon exploitation	ADFG	152.
Management Actions	Fish/Shellfish	920615298. 34	wild fish stock information assessment	USDA	50.
Management Actions	Recreation	920601050. 15	improve marine parks	NOAA	100.
Management Actions	Recreation	920615296. 6	marine recreation plan for spill area	ADNR	120.
Management Actions	Recreation	920615296. 10	recreation field management and monitoring	ADNR	700.
Management Actions	Recreation	920615298. 10	protect resources and enhance visitor enjoyment through increased administrative presence	USDA	500.
Management Actions	Recreation	920615298. 12	sustainable tourism in pws	USDA	240.
Management Actions	Recreation	920615298. 26	interpretation of pws	USDA	10.
Management Actions	Recreation	920615298. 28	post-oilspill recreation-based user survey for pws	USDA	58.
Management Actions	Services	920601050. 12	oil spill cooperative/training center		5000.
Management Actions	Services	920601050. 13	valdez oversight of oil industry		150.
Management Actions	Services	920601050. 17	train valdez personnel for environmental incidents		50.
Management Actions	Sub-Tidal	920615289. 1	field study of bioremediation enhancement treatment methods	ADEC	280.
Management Actions	Terestrial Mammals	920612237. 5	Watchable Wildlife	ADFG	
Management Actions	Terestrial Mammals	920615297. 13	synthesis of information on ecology and injury to river otters in pws	ADFG	40.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Total number of ideas for category: 105			Total cost of ideas (in thousands) for Category:		145724.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
	Education	920605123.	Same as 920605137		

Total number of ideas for category:	1	Total cost of ideas (in thousands) for Category:	0.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Air/Water	920615286. 1	silver lake hydropower project		15000.
Manipulation and Enhancement	Air/Water	920615286. 3	power creek hydropower project	ADNR	10.
Manipulation and Enhancement	Air/Water	920615286. 4	silver lake to ellamar to tatilek underwater intertie	ADNR	2000.
Manipulation and Enhancement	Archaeology	920615273. 9	Site-specific archaeaological restoration in Kenai and Katmai national parks	DOI/USNPS	100.
Manipulation and Enhancement	Archaeology	920615294. 2	restoration of chenega village site	ADNR	75.
Manipulation and Enhancement	Archaeology	920615296. 2	heritage information replacement	ADNR	200.
Manipulation and Enhancement	Birds	920603092. 1	Habitat aquisition evaluation, evaluate pacific seabird group list, eliminate predators.		0.
Manipulation and Enhancement	Birds	920603092. 2	removal of alien predators from bird colonies	DOI/USFWS	0.
Manipulation and Enhancement	Birds	920608200.	Seabird Colony Restoration	DOI/USFWS	0.
Manipulation and Enhancement	Birds	920611233. 1	restoration of murres by way of behavioral attraction and habitat enhancement	DOI/USFWS	51.
Manipulation and Enhancement	Birds	920611233. 2	restoration of murres by way of transplantation of chicks-feasibility study	DOI/USFWS	73.
Manipulation and Enhancement	Birds	920611233. 4	marbled murrelet vocalizations in conjunction with artificial nests	DOI/USFWS	47.
Manipulation and Enhancement	Birds	920615273. 20	removal of introduced foxes to restore breeding seabirds. Same as 920615279-17	DOI/USFWS	500.
Manipulation and Enhancement	Birds	920615279. 17	Removal of introduced foxes to restore breeding seabirds. Same as 920615273-20	DOI/USFWS	960.
Manipulation and Enhancement	Coastal Habitat	920528045.	beach subsurface oil recovery	ADEC	0.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Coastal Habitat	920601061. 1	natural product natural life restoration.	ADEC	388.
Manipulation and Enhancement	Coastal Habitat	920601062. 1	Natural Product Natural Life Restoration	ADEC	0.
Manipulation and Enhancement	Coastal Habitat	920601063.	Shoreline worm life monitoring	ADEC	388.
Manipulation and Enhancement	Coastal Habitat	920610229. 1	fucus restoration feasibility study	USDA	70.
Manipulation and Enhancement	Coastal Habitat	920612237. 2	restore shorelines damaged by beach berm-relocation	ADNR	0.
Manipulation and Enhancement	Coastal Habitat	920615266.	Rapid restoration of weathered crude contaminated beach subsurface material.	ADEC	800.
Manipulation and Enhancement	Coastal Habitat	920615273. 35	Hydrodynamic purging of oil from contaminated beaches, pws.	ADEC	500.
Manipulation and Enhancement	Coastal Habitat	920615294. 3	chenega bay subsistence restoration project (Remove Oil)	ADEC	200.
Manipulation and Enhancement	Coastal Habitat	920615298. 35	restoration and mitigation of essential wetland habitats for pws fish and wildlife	USDA	200.
Manipulation and Enhancement	Coastal Habitat	920615298. 54	restoration of second growth habitat for wildlife in pws	USDA	40.
Manipulation and Enhancement	Coastal Habitat	920616307. 1	restoration of high-intertidal fucus following EVOS	USDA	65.
Manipulation and Enhancement	Education	920615251. 1	valdez city schools		300.
Manipulation and Enhancement	Fish/Shellfish	920514004.	C-lab; a system for monitoring	NOAA	1100.
Manipulation and Enhancement	Fish/Shellfish	920514006.	clam enhancement	ADFG	120.
Manipulation and Enhancement	Fish/Shellfish	920527041.	bivalve shellfish rehabilitation project	ADFG	860.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Fish/Shellfish	920605124.	Same as 920616305	ADFG	3400.
Manipulation and Enhancement	Fish/Shellfish	920605131.	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920605132.	fort richardson pipeline. Same as 920616305.		0.
Manipulation and Enhancement	Fish/Shellfish	920605133.	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920605134.	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920605135.	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920608202.	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920608204.	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920612242.	seward shellfish hatchery	ADFG	1300.
Manipulation and Enhancement	Fish/Shellfish	920612243.	paint river fish ladder salmon stocking program	ADFG	50.
Manipulation and Enhancement	Fish/Shellfish	920615249. 2	cutthroat trout and dolly varden hatchery	ADFG	950.
Manipulation and Enhancement	Fish/Shellfish	920615249. 3	shelter cove, cordova restoration project	ADFG	50.
Manipulation and Enhancement	Fish/Shellfish	920615270. 1	port graham salmon hatchery	ADFG	2500.
Manipulation and Enhancement	Fish/Shellfish	920615270. 2	village mariculture project	ADFG	250.
Manipulation and Enhancement	Fish/Shellfish	920615271. 1	rapid restoration of weathered crude beach subsurface material. Same as 920615266	ADEC	800.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Fish/Shellfish	920615279. 1	Red Lake Salmon Restoration. Same as 920615297-69	ADFG	56.
Manipulation and Enhancement	Fish/Shellfish	920615279. 2	red lake mitigation	ADFG	191.
Manipulation and Enhancement	Fish/Shellfish	920615279. 4	cold creek pink salmon restoration. Same as 920615297	ADFG	15.
Manipulation and Enhancement	Fish/Shellfish	920615279. 5	Same as 920615279	ADFG	25.
Manipulation and Enhancement	Fish/Shellfish	920615279. 6	Same as 920615297-22	ADFG	0.
Manipulation and Enhancement	Fish/Shellfish	920615279. 7	Same as 920615279-23	ADFG	0.
Manipulation and Enhancement	Fish/Shellfish	920615279. 24	kitoi bay hatchery on afognak island	ADFG	45.
Manipulation and Enhancement	Fish/Shellfish	920615279. 29	enhancement of the pacific herring	ADFG	120.
Manipulation and Enhancement	Fish/Shellfish	920615286. 2	silver lake fish hatchery	ADFG	1000.
Manipulation and Enhancement	Fish/Shellfish	920615291. 2	Restoration of windy bay mussel beds.	ADEC	500.
Manipulation and Enhancement	Fish/Shellfish	920615294. 1	Restoration of mussel beds.	ADEC	500.
Manipulation and Enhancement	Fish/Shellfish	920615294. 5	chenega chinook and silver salmon release program	ADFG	5.
Manipulation and Enhancement	Fish/Shellfish	920615297. 6	replacement of oiled mussels with commercially produced mussels	ADFG	500.
Manipulation and Enhancement	Fish/Shellfish	920615297. 7	mariculture technical center	ADFG	2200.
Manipulation and Enhancement	Fish/Shellfish	920615297. 9	lower cook inlet sockeye salmon restoration and enhancement	ADFG	143.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Fish/Shellfish	920615297. 20	cold creek pink salmon restoration	ADFG	17.
Manipulation and Enhancement	Fish/Shellfish	920615297. 21	horse marine creek pink salmon restoration	ADFG	28.
Manipulation and Enhancement	Fish/Shellfish	920615297. 22	waterfall creek pink salmon restoration-fish improvement	ADFG	55.
Manipulation and Enhancement	Fish/Shellfish	920615297. 23	pink creek pink salmon restoration	ADFG	11.
Manipulation and Enhancement	Fish/Shellfish	920615297. 48	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 49	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 50	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 51	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 52	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 53	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 54	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 55	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 56	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 57	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 58	fort richardson pipeline. Same as 920616305		0.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Fish/Shellfish	920615297. 59	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 60	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 61	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 62	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 63	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 64	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 65	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 66	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 67	fort richardson pipeline. Same as 920616305		0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 69	red lake salmon restoration	ADFG	72.
Manipulation and Enhancement	Fish/Shellfish	920615297. 70	Same as 920615279-2	ADFG	0.
Manipulation and Enhancement	Fish/Shellfish	920615297. 71	fry rearing to improve survival and restore wild pink and chum salmon stocks	ADFG	727.
Manipulation and Enhancement	Fish/Shellfish	920615297. 72	Restoration of the Coghill Lake sockeye salmon stock.	ADFG	165.
Manipulation and Enhancement	Fish/Shellfish	920615297. 73	Instream habitat and stock restoration techniques for anadromous fish.	ADFG	416.
Manipulation and Enhancement	Fish/Shellfish	920615297. 75	Est. an ecological basis for restoring and enhancing the mixed-stock salmon resources of pws.	ADFG	385.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Fish/Shellfish	920615298. 33	fish limiting factors analysis	USDA	125.
Manipulation and Enhancement	Fish/Shellfish	920615298. 36	stream channel type classification and fish habitat assessment	USDA	50.
Manipulation and Enhancement	Fish/Shellfish	920615298. 37	montague island chum salmon restoration	USDA	80.
Manipulation and Enhancement	Fish/Shellfish	920615298. 38	anadromous cutthroat and dolly varden char habitat inventory, evaluation, and restoration	USDA	35.
Manipulation and Enhancement	Fish/Shellfish	920615298. 41	feasibility of fish passes as oilspill restoration	USDA	25.
Manipulation and Enhancement	Fish/Shellfish	920615298. 43	stream channel capability modeling	USDA	110.
Manipulation and Enhancement	Fish/Shellfish	920616305.	fort richardson pipeline.	ADFG	3400.
Manipulation and Enhancement	Fish/Shellfish	920618316. 1	Mussel Bed Treatment	ADEC	500.
Manipulation and Enhancement	Fish/Shellfish	920618316. 2	Mussel Bed Treatment	ADEC	250.
Manipulation and Enhancement	Marine Mammals	920615247. 1	oiled wildlife rehabilitation center		6000.
Manipulation and Enhancement	Recreation	920601050. 14	increased access pws	USDA	1000.
Manipulation and Enhancement	Recreation	920615296. 7	public use cabins in state marine parks	ADNR	150.
Manipulation and Enhancement	Recreation	920615298. 8	pws kayak trail	USDA	100.
Manipulation and Enhancement	Recreation	920615298. 14	Prince William Sound campground	USDA	70.
Manipulation and Enhancement	Recreation	920615298. 15	pws recreation facilities	USDA	250.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Recreation	920615298. 16	enhanced trail opportunities, including columbia and blackstone glacier trails	USDA	150.
Manipulation and Enhancement	Recreation	920615298. 24	green island cabin replacement	USDA	20.
Manipulation and Enhancement	Recreation	920615298. 55	Low impact recreation development Nellie Juan, College Fiord wilderness study area	USDA	100.
Manipulation and Enhancement	Services	920601050. 1	oil and grease separator/valdez harbor		50.
Manipulation and Enhancement	Services	920601050. 2	oil and grease separator/fidalgo		150.
Manipulation and Enhancement	Services	920601050. 3	oil and grease separator/hazelet		150.
Manipulation and Enhancement	Services	920601050. 4	valdez landfill upgrade		250.
Manipulation and Enhancement	Services	920601050. 5	valdez recycling		100.
Manipulation and Enhancement	Services	920601050. 6	valdez sewage treatment plant upgrade		2000.
Manipulation and Enhancement	Services	920601050. 7	valdez garbage scow facilities		250.
Manipulation and Enhancement	Services	920601050. 8	Valdez/remediate existing landfills		2000.
Manipulation and Enhancement	Services	920601050. 9	valdez hazardous waste collection		200.
Manipulation and Enhancement	Services	920601050. 10	landfill liner		1000.
Manipulation and Enhancement	Services	920601050. 16	assist valdez handle waste oil		50.
Manipulation and Enhancement	Services	920601050. 18	Improve public health facilities, PWS		250.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Manipulation and Enhancement	Sub-Tidal	920618316. 3	kelp regeneration in the upper intertidal	ADFG	300.
Manipulation and Enhancement	Terestrial Mammals	920514007.	transplant project for deer and elk	ADFG	0.

Total number of ideas for category: 122	Total cost of ideas (in thousands) for Category: 59688.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Habitat Protection and Acquisition	Education	920615294. 4	17(b) easement identification		0.
Habitat Protection and Acquisition	Land Acquisition	920601051. 1	land exchange chuyak island for land on kodiak island road system	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920601051. 2	acquisition of recreational sites on kodiak road system	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920601058. 10	land exchange shuyak for kodiak land on road system	HPWG	70.
Habitat Protection and Acquisition	Land Acquisition	920601058. 11	acquisition of recreational sites on kodiak road system	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920609217. 1	habitat acq. kachemak	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920609221. 1	habitat acq. kodiak, kodiak refuge	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920612246. 1	purchase of seldovia native assoc, timber trading co, cook inlet region, inholdings kachemak bay	HPWG	11000.
Habitat Protection and Acquisition	Land Acquisition	920615257. 1	Acquisition of Koniag Corp. inholdings within the Kodiak National Wildlife refuge.	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920615279. 8	Habitat acq., North Afognak Island	HPWG	4000.
Habitat Protection and Acquisition	Land Acquisition	920615279. 9	kodiak bear refuge stream mouth inholdings acq.	HPWG	1000.
Habitat Protection and Acquisition	Land Acquisition	920615279. 12	Habitat acq., Kodiak Island	HPWG	5000.
Habitat Protection and Acquisition	Land Acquisition	920615279. 20	acquisition of inholdings in shuyak island state park	HPWG	200.
Habitat Protection and Acquisition	Land Acquisition	920615279. 21	Sites for recreation along Kodiak road system		500.
Habitat Protection and Acquisition	Land Acquisition	920615279. 68	Same as 920615297-68	HPWG	1000.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Habitat Protection and Acquisition	Land Acquisition	920615288. 1	kodiak wildlife habitat conservation and acquisition project	HPWG	5000.
Habitat Protection and Acquisition	Land Acquisition	920615293. 1	land acq. pws, kodiak	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920615295. 1	Habitat acq., Afognak	HPWG	112500.
Habitat Protection and Acquisition	Land Acquisition	920615296. 1	Archaeaological restoration site acquisition.	HPWG	200.
Habitat Protection and Acquisition	Land Acquisition	920615296. 8	Acquisition of important recreation lands	HPWG	500.
Habitat Protection and Acquisition	Land Acquisition	920615297. 68	weir and conservation land acquisition	HPWG	1100.
Habitat Protection and Acquisition	Land Acquisition	920618318. 1	acquisition of koniag corp inholdings within the kodiak state park	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920619321. 1	acquire olsen bay watershed	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920619323. 1	habitat acq. of koniag corp. inholdings, kodiak national wildlife refuge	HPWG	0.
Habitat Protection and Acquisition	Land Acquisition	920622324. 1	Acquisition of habitat, Afognak Island.	HPWG	112500.
Habitat Protection and Acquisition	Inventory	920602084. 1	damage assessment of economic damages to wilderness-based tourism	ADNR	0.
Habitat Protection and Acquisition	Inventory	920611233. 6	quantification of stream habitat for harlequin ducks from remotely sensed data	HPWG	53.
Habitat Protection and Acquisition	Inventory	920612250. 1	Study impact of clearcut logging operations on bird populations, Katchemak Bay State Park.		0.
Habitat Protection and Acquisition	Inventory	920615273. 25	identification of nesting habitat criteria and reproductive success for marbled murrelet		240.
Habitat Protection and Acquisition	Inventory	920615273. 26	Survey to ID upland use by murrelets		180.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Habitat Protection and Acquisition	Inventory	920615273. 30	identification and protection of important bald eagle habitats		262.
Habitat Protection and Acquisition	Inventory	920615291. 1	Mark and 17(b) easements on Port Graham Land.		0.
Habitat Protection and Acquisition	Inventory	920615297. 27	stream habitat assessment (R47)		361.
Habitat Protection and Acquisition	Inventory	920615297. 29	identification of critical upland wildlife habitat in pws		66.
Habitat Protection and Acquisition	Inventory	920615298. 44	characterization and identification of habitats important to upland species (harlequin, murrelet,etc		750.
Habitat Protection and Acquisition	Inventory	920615298. 45	Vegetation and stream classification and mapping of western pws.		276.
Habitat Protection and Acquisition	Inventory	920615298. 46	wetland habitat classification, mapping and assessment	HPWG	100.
Habitat Protection and Acquisition	Inventory	920615298. 52	distribution, abundance, habitat use and phylogeny of canada geese in pws		50.
Habitat Protection and Acquisition	Inventory	920615298. 53	inland survey of marbled murrelet habitat use in pws		40.
Habitat Protection and Acquisition	Inventory	920622326. 1	workshop to identify critical habitats in pws temporate rain forest		25.
Habitat Protection and Acquisition	Inventory	920622326. 7	characterization of near-shore bottom habitat	ADFG	237.
Habitat Protection and Acquisition	Inventory	920622326. 10	Mapping streams and salmon spawning in PWS.		90.

Total number of ideas for category: 42	Total cost of ideas (in thousands) for Category: 257300.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Restoration Monitoring	Archaeology	920615273. 12	Archaeaological site protection-site patrol monitoring-interagency	DOI/USFWS	210.
Restoration Monitoring	Archaeology	920615273. 13	Archaeaological site protection-site patrol and monitoring-national park service	DOI/USFWS	60.
Restoration Monitoring	Birds	920601058. 7	Use and productivity of bald eagle nest sites, Kodiak	DOI/USFWS	55.
Restoration Monitoring	Birds	920604106. 1	monitoring and cataloging migratory birds along gulf of alaska	DOI/USFWS	0.
Restoration Monitoring	Birds	920615273. 2	determine the extent of oil spill injuries to harlequin ducks in national parks	ADFG	200.
Restoration Monitoring	Birds	920615273. 3	determine status of marbled murrelet populations in oiled national parks	DOI/USFWS	200.
Restoration Monitoring	Birds	920615273. 5	determine the status of bald eagle populations in oiled national parks	DOI/USFWS	80.
Restoration Monitoring	Birds	920615273. 17	feeding ecology and reproductive success of black oystercatchers in pws	DOI/USFWS	125.
Restoration Monitoring	Birds	920615273. 18	Monitoring rate of recovery of murres in breeding colonies downstream from oil spill. Same as 920615279-19	DOI/USFWS	340.
Restoration Monitoring	Birds	920615273. 23	pigeon guillemot recovery enhancement and monitoring	DOI/USFWS	180.
Restoration Monitoring	Birds	920615273. 24	Assessment of Marbled Murrelet foraging habitat requirements during breeding season	DOI/USFWS	250.
Restoration Monitoring	Birds	920615273. 27	monitor population status of seabird nesting colonies in the spill zone	DOI/USFWS	100.
Restoration Monitoring	Birds	920615273. 28	monitor productivity of bald eagles in pws kodiak and alaska pen. pacific coast	DOI/USFWS	153.
Restoration Monitoring	Birds	920615273. 29	long-term population monitoring for bald eagles	DOI/USFWS	115.
Restoration Monitoring	Birds	920615279. 13	bald eagle productivity survey and catalog	DOI/USFWS	10.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Restoration Monitoring	Birds	920615279. 15	breeding population status of harlequin ducks on areas of the kodiak island group w. and s. sides	ADFG	25.
Restoration Monitoring	Birds	920615279. 16	bald eagle nesting surveys-alaska pen. pacific coast	DOI/USFWS	22.
Restoration Monitoring	Birds	920615279. 18	reduce disturbance near murre colonies damaged by oil spill	DOI/USFWS	40.
Restoration Monitoring	Birds	920615279. 19	Monitoring the rate of recovery of murres in breeding colonies in or downstream from oil spill. Same as 920615273-1	DOI/USFWS	40.
Restoration Monitoring	Birds	920615297. 31	harlequin duck restoration and monitoring study	ADFG	446.
Restoration Monitoring	Birds	920615298. 30	survey to determine abundance distribution, habitat and food habits of staging shore birds w CR delta	USDA	35.
Restoration Monitoring	Birds	920615298. 31	survey to determine distribution, abundance, food habits of migratory waterfowl staging w. CR delta	USDA	91.
Restoration Monitoring	Birds	920615298. 32	migratory shore birds staging in rocky intertidal habitats of pws	USDA	80.
Restoration Monitoring	Birds	920615298. 40	migratory waterfowl and shorebird monitoring	USDA	150.
Restoration Monitoring	Coastal Habitat	920601059.		ADEC	1072.
Restoration Monitoring	Coastal Habitat	920610228. 1	Herring bay experimental and monitoring studies. Same as 920615297-19	USDA	450.
Restoration Monitoring	Coastal Habitat	920610228. 2	coastal habitat comprehensive intertidal monitoring program	ADFG	500.
Restoration Monitoring	Coastal Habitat	920610229. 2	fucus recovery in upper intertidal zones (continuation of study)	USDA	160.
Restoration Monitoring	Coastal Habitat	920610229. 4	remote monitoring of intertidal recovery	USDA	90.
Restoration Monitoring	Coastal Habitat	920615258. 1	recovery monitoring of intertidal oiled mussel beds in pws and gulf of alaska	NOAA	325.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Restoration Monitoring	Coastal Habitat	920615264. 1	natural recovery of oiled and treated shorelines	NOAA	600.
Restoration Monitoring	Coastal Habitat	920615273. 4	recovery monitoring of intertidal oiled mussel beds outside pws	NOAA	175.
Restoration Monitoring	Coastal Habitat	920615273. 36	fate and transport of subsurface hydrocarbons in beach deposits in pws	DOI/USGS	600.
Restoration Monitoring	Coastal Habitat	920615275. 1	cook inlet comprehensive environmental monitoring program	NOAA	800.
Restoration Monitoring	Coastal Habitat	920615279. 25	thirteen commercial species assessment	NOAA	200.
Restoration Monitoring	Coastal Habitat	920615279. 99	Monitor sites - Collector beaches and Lagoons.	ADFG	500.
Restoration Monitoring	Coastal Habitat	920615290. 1	shoreline assessment	ADEC	90.
Restoration Monitoring	Coastal Habitat	920615297. 18	coastal habitat comprehensive intertidal monitoring program	USDA	1650.
Restoration Monitoring	Coastal Habitat	920615297. 19	herring bay experimental and monitoring studies	ADFG	495.
Restoration Monitoring	Ecosystem	920515016. 1	toxicological profile of pws	NOAA	150.
Restoration Monitoring	Ecosystem	920526039. 1	Long-term monitoring of marine environment of Resurrection Bay.	NOAA	0.
Restoration Monitoring	Ecosystem	920615262. 2	Comprehensive Monitoring Program	NOAA	500.
Restoration Monitoring	Ecosystem	920615298. 29	inventory, monitor, protect permanent monitoring sites	USDA	500.
Restoration Monitoring	Ecosystem	920622326. 8	multi-agency university ecosystem study of pws	USDA	6000.
Restoration Monitoring	Fish/Shellfish	920603093. 1	build research and monitoring facilities and program/cook inlet, kodiak	NOAA	1250.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Restoration Monitoring	Fish/Shellfish	920610223.	Intertidal/shallow subtidal crustacean (decapod) composition. Same as 920615297-47	ADFG	250.
Restoration Monitoring	Fish/Shellfish	920610224.	Juvenile spot shrimp habitat. Same as 920615297-46	ADFG	100.
Restoration Monitoring	Fish/Shellfish	920610231. 3	Genetic stock identification for herring in pws. Same as 920615297-34	ADFG	186.
Restoration Monitoring	Fish/Shellfish	920610231. 4	PWS herring tagging feasibility study. Same as 920615297-4	ADFG	102.
Restoration Monitoring	Fish/Shellfish	920610231. 5	Larval herring age and growth in pws using otoliths. Same as 920615299-5	ADFG	54.
Restoration Monitoring	Fish/Shellfish	920615260. 1	restoration recovery monitoring of stream-rearing anadromous salmonids	USDA	200.
Restoration Monitoring	Fish/Shellfish	920615262. 1	Distribution of prey species for apex predator species (murre, guillemot, murrelet, harbor seal etc)	NOAA	500.
Restoration Monitoring	Fish/Shellfish	920615265. 1	PWS long-term monitoring program-acute and chronic toxicity of residual hydrocarbons, littleneck clam.	NOAA	50.
Restoration Monitoring	Fish/Shellfish	920615273. 32	Abundance and distribution of forage fish and their influence on recovery of seabirds impacted by evos	NOAA	250.
Restoration Monitoring	Fish/Shellfish	920615273. 33	Hydrocarbons in musseles from coastal gulf of alaska, cook inlet and shelikof strait.	NOAA	200.
Restoration Monitoring	Fish/Shellfish	920615279. 30	assessment and quality assurance of shellfish resources	ADFG	300.
Restoration Monitoring	Fish/Shellfish	920615297. 4	pws herring tagging feasibility study	ADFG	112.
Restoration Monitoring	Fish/Shellfish	920615297. 5	larval herring age and growth in pws using otoliths	ADFG	60.
Restoration Monitoring	Fish/Shellfish	920615297. 10	subsistence food safety testing	ADFG	308.
Restoration Monitoring	Fish/Shellfish	920615297. 25	Monitoring for recruitment of littleneck clams.	ADFG	205.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Restoration Monitoring	Fish/Shellfish	920615297. 36	genetic monitoring of kodiak island sockeye salmon	ADFG	275.
Restoration Monitoring	Fish/Shellfish	920615297. 37	pink salmon egg to pre-emergent fry survival in pws	ADFG	385.
Restoration Monitoring	Fish/Shellfish	920615297. 45	pws spot shrimp survey	ADFG	88.
Restoration Monitoring	Fish/Shellfish	920615298. 42	PWS Salmon stock genetics.	ADFG	150.
Restoration Monitoring	Fish/Shellfish	920618315. 1	monitoring injury to rockfish in pws	ADFG	117.
Restoration Monitoring	Marine Mammals	920514005. 1	restoration of killer whales in pws	NOAA	90.
Restoration Monitoring	Marine Mammals	920601058. 8	Sea otters in kodiak archipelago - population status,trends. See 920615273-15	DOI/USFWS	145.
Restoration Monitoring	Marine Mammals	920615261. 1	photo-identification studies of pws killer whales	NOAA	120.
Restoration Monitoring	Marine Mammals	920615261. 2	use of satellite transmitters to investigate killer whale ecology in pws	NOAA	180.
Restoration Monitoring	Marine Mammals	920615261. 3	monitoring of small cetaceans in pws	NOAA	200.
Restoration Monitoring	Marine Mammals	920615273. 15	Monitoring of sea otter population abundance, distribution, reproduction, and mortality.	DOI/USFWS	337.
Restoration Monitoring	Marine Mammals	920615273. 16	habitat utilization by sea otters and designation of protected areas	DOI/USFWS	83.
Restoration Monitoring	Marine Mammals	920615273. 21	radio-telemetry project to monitor recovery of sea otters	DOI/USFWS	450.
Restoration Monitoring	Marine Mammals	920615273. 22	surveys to monitor marine bird and sea-otter populations	DOI/USFWS	275.
Restoration Monitoring	Marine Mammals	920615279. 14	sea otter population survey and trends	DOI/USFWS	145.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Restoration Monitoring	Marine Mammals	920615297. 14	habitat use and behavior of harbor seals in pws	ADFG	165.
Restoration Monitoring	Marine Mammals	920615297. 15	monitoring trends in abundance of harbor seals in pws 1993-1994	ADFG	39.
Restoration Monitoring	Recreation	920612237. 3	annual garbage cleanup program for oil spill impacted beaches		0.
Restoration Monitoring	Sub-Tidal	920610230. 1	experimental evaluation of oiled/control paired design used in assessing inter /subtidal community	ADFG	150.
Restoration Monitoring	Sub-Tidal	920612236. 1	quantification of intertidal algal recovery using multispectral digital remote sensing	USDA	195.
Restoration Monitoring	Sub-Tidal	920612236. 3	Experimental evaluation of the oiled/control paired design used in assessing inter/subtidal comm.. Same as 920610230-1	USDA	150.
Restoration Monitoring	Sub-Tidal	920612236. 4	experimental studies of interaction between subtidal epifaunal invertebrates	USDA	90.
Restoration Monitoring	Sub-Tidal	920615259. 1	recovery monitoring of hydrocarbons-contaminated subtidal marine sediment resources	NOAA	390.
Restoration Monitoring	Sub-Tidal	920615263. 1	natural recovery of sub-tidal species in pws	NOAA	230.
Restoration Monitoring	Sub-Tidal	920615264. 2	new field test of bioremediation	NOAA	250.
Restoration Monitoring	Sub-Tidal	920615297. 12	injury and recovery of deep-benthic macro faunal communities	ADFG	275.
Restoration Monitoring	Sub-Tidal	920615297. 24	natural recovery monitoring of subtidal eelgrass communities in pws	ADFG	265.
Restoration Monitoring	Sub-Tidal	920615297. 76	Quantification of intertidal algal recovery using multispectral digital remote sensing. Same as 920612236-1	ADFG	195.
Restoration Monitoring	Sub-Tidal	920615297. 77	Experimental studies of interactions between subtidal epifaunal invertebrates. Same as 920610230-2	ADFG	90.
Restoration Monitoring	Technical Support	920622326. 3	full funding for cordova oil spill recovery institute		0.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Restoration Monitoring	Terestrial Mammals	920615273. 1	productivity and survival of brown bears in katmai national park	DOI/USNPS	165.

Total number of ideas for category:	91	Total cost of ideas (in thousands) for Category:	27680.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Technical Support	Archaeology	920601049. 3	Archaeaological specimens university of alaska museum	ADNR	41.
Technical Support	Birds	920601049. 2	bird and mammal specimens university of alaska museum	ADNR	77.
Technical Support	Coastal Habitat	920601049. 1	coastal habitat specimens university of alaska museum	ADNR	310.
Technical Support	Coastal Habitat	920601054. 1	november 91 request for immediate funding for coastal hab specimens	ADNR	104.
Technical Support	Coastal Habitat	920601065. 1	Archive biological and archaeaological specimens - revised proposal	ADNR	500.
Technical Support	Education	920615254. 1	cold weather oil spill school		3000.
Technical Support	Endowments	920601058. 1	select critical sites for baseline data collection		0.
Technical Support	Endowments	920601058. 2	set up revolving fund for baseline sampling and analysis		0.
Technical Support	Endowments	920601058. 4	analyze nrda samples left un-analyzed	NOAA	0.
Technical Support	Endowments	920601067. 1	alaska land and wildlife conservation fund		
Technical Support	Endowments	920603094. 1	exxon valdez oil spill marine sciences endowment I		
Technical Support	Endowments	920603094. 2	exxon valdez oil spill marine sciences endowment II		
Technical Support	Endowments	920604101. 1	endowment of sinking fund		
Technical Support	Endowments	920615256. 1	payoff debt of valdez fisheries development association		5000.
Technical Support	Endowments	920615272.	Sturgelewski endowment		0.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Technical Support	Endowments	920615279. 98	Kodiak Island Borough Endowment fund to support restoration activities.		
Technical Support	Endowments	920615287. 1	endowment proposal I		
Technical Support	Endowments	920615287. 2	endowment proposal II		
Technical Support	Endowments	920615296. 9	Endowment	USDA	4500.
Technical Support	Endowments	920615298. 13	Endowment	USDA	70.
Technical Support	Endowments	920615298. 51	Endowment	USDA	5000.
Technical Support	GIS	920608191. 1	public access repository for oil spill geographic information system	ADNR	100.
Technical Support	GIS	920611233. 5	establishment of user-friendly gis and remote-sensing demonstration center for public-5 communities	ADNR	72.
Technical Support	GIS	920612236. 2	providing public access to oilspill gis databases using arcview in pc windows environment	ADNR	120.
Technical Support	GIS	920615273. 34	cd-rom publication of digital spatial data from exxon valdez oil spill mapping activities	DOI/USGS	8.
Technical Support	GIS	920615298. 47	Geographic information system mapping of natural resources in western pws	ADNR	75.
Technical Support	GIS	920622326. 6	experimental designs and statistical procedures for damage for oilspill cleanup-restoration projects	ADNR	77.
Technical Support	GIS	920622326. 9	interactive public access to oilspill and related environmental data in pws science center gis	ADNR	80.
Technical Support	Services	920511138. 1	oily bilge water/oily waste treatment - several oil spill communities		0.
Technical Support	Services	920604115. 1	kitoi bay hatchery oil spill (clean-up) equipment storage	ADFG	100.

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Technical Support	Services	920608184. 1	database integration	ADFG	148.
Technical Support	Services	920608184. 2	database management - nrda fs30	ADFG	104.
Technical Support	Services	920608184. 3	management of restoration database, sample archiving, chemical interpretation	ADFG	75.
Technical Support	Services	920608184. 8	database integration	ADFG	159.
Technical Support	Services	920614300. 1	build facilities for oil workers who work in karluk kodiak area		0.
Technical Support	Services	920615252. 1	tanker inspection facility		20000.
Technical Support	Services	920615253. 1	oil spill response valdez cleanup coop		50000.
Technical Support	Services	920615258. 2	Mgmt. of Restoration Database,Samples, Archiving, and Chemical Interpretation	NOAA	75.
Technical Support	Services	920615274. 1	construction of chenega bay marine service center	ADNR	2500.
Technical Support	Services	920615279. 23	villages kitoi bay hatchery and other site prevention and response	ADFG	250.
Technical Support	Services	920615290. 2	electronic archiving of exxon valdez response records	ADEC	450.
Technical Support	Services	920615297. 8	Same as 920608184-1		
Technical Support	Services	920615297. 16	development of economic guidelines and cost benefit analysis of oilspill projects for NEPA and TC	USDA	65.
Technical Support	Services	920615297. 26	kitoi bay hatchery oil spill equipment storage	ADFG	165.
Technical Support	Services	920615298. 1	cultural emergency response system	USDA	100.

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Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Technical Support	Services	920615298. 2	multi-agency library on pws and copper river delta	USDA	150.
Technical Support	Services	920615298. 3	oilspill injured resources literature research and review	USDA	7.
Technical Support	Services	920615298. 48	communication system for oil spill program	USDA	0.
Technical Support	Services	920615298. 49	oil spill restoration support service and facilities	USDA	600.
Technical Support	Services	920616310.	near island fisheries research center	ADFG	3500.
Technical Support	Services	920617313. 1	construction of chenega marine service center	ADNR	2500.
Technical Support	Sub-Tidal	920615297. 11	develop protocols for analysis and assessment of benthic biological, physical, and hydrocarbon data	ADFG	300.
Technical Support	Technical Support	920622326. 2	full funding for oil spill recovery institute	NOAA	5000.
Technical Support	Technical Support	920622326. 5	develop video library of intertidal habitat and biota to assess impact and determine recovery	USDA	155.
Technical Support	Technical Support	920622326. 11	establish natural resource library and computer support technical service in cordova	USDA	450.

Total number of ideas for category:	55	Total cost of ideas (in thousands) for Category:	105987.

DRAFT

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Comments	Land Acquisition	920514010. 1	habitat acq. kachemak, pws, afognak		0.
Comments	Land Acquisition	920526017.	habitat acq. pws		
Comments	Land Acquisition	920526019.	restore national parks		
Comments	Land Acquisition	920526024.	habitat acq.		
Comments	Land Acquisition	920526026.	habitat acq.		
Comments	Land Acquisition	920526029.	habitat acq./support science studies		
Comments	Land Acquisition	920526035.	restore national parks/habitat acq.		
Comments	Land Acquisition	920526036.	habitat acq. kodiak		
Comments	Land Acquisition	920526038. 1	habitat acq. kodiak refuge, pws, and kachemak bay		0.
Comments	Land Acquisition	920601068.	habitat acq.		
Comments	Land Acquisition	920601070.	habitat acq. kodiak, kenai fjords, chugach		
Comments	Land Acquisition	920601071.	habitat acq./restore archaeological resources in national parks/ long term monitoring all species		
Comments	Land Acquisition	920601072. 1	habitat acq. pws		0.
Comments	Land Acquisition	920601073. 1	habitat acq.		0.
Comments	Land Acquisition	920602081. 1	habitat acq.		0.

DRAFT

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Comments	Land Acquisition	920602083.	habitat acq.		
Comments	Land Acquisition	920602085.	habitat acq.		
Comments	Land Acquisition	920602086.	habitat acq.	HPWG	
Comments	Land Acquisition	920602087.	habitat acq.,especially national parks,forests		
Comments	Land Acquisition	920602088.	habitat ac./use forests for education		
Comments	Land Acquisition	920602089.	restore national parks and monuments		
Comments	Land Acquisition	920602090.	habitat acq.		
Comments	Land Acquisition	920603095.	habitat acq.		
Comments	Land Acquisition	920603096. 1	habitat acq.		0.
Comments	Land Acquisition	920604105. 1	habitat acq.		0.
Comments	Land Acquisition	920604107.	habitat acq. as in hb 411		
Comments	Land Acquisition	920604109.	Habitat acq., especially kodiak.		
Comments	Land Acquisition	920604110.	habitat acq.		
Comments	Land Acquisition	920604117. 1	habitat acq. - chugach, kenai fjords, cape suckling afognak, alaska maritime refuge, kachemak bay		0.
Comments	Land Acquisition	920605122.	Habitat acq./use Nature Conservancy	HPWG	

Category	Project Type	Document ID	Project Title	Preliminary Lead Agency	Cost (thousands)
Comments	Land Acquisition	920608190.	habitat acq. pws		
Comments	Land Acquisition	920608192.	restore national parks		
Comments	Land Acquisition	920608194.	habitat acq., long-term monitoring, fund existing institutes, centralize GIS, better prevention	HPWG	
Comments	Land Acquisition	920608203.	habitat acq. - scenic areas, streams, other critical habitat	HPWG	
Comments	Land Acquisition	920609215. 1	habitat acq./ sea mammal research/ database of information accessible to all.		0.
Comments	Land Acquisition	920609218. 1	habitat acq.		0.
Comments	Land Acquisition	920612239. 1	habitat acq. as described in HB411		0.
Comments	Land Acquisition	920612240. 1	habitat acq. kodiak, pws		0.
Comments	Land Acquisition	920616308. 1	habitat acq. pws		0.
Comments	Land Acquisition	920619320. 1	habitat acq.		0.
Comments	Inventory	920602084. 2	define and identify land for acq. to benefit wilderness-based tourism		0.
Comments	Marine Mammals	920514001. 1	marine mammal projects should be competitively bid	NOAA	0.
Comments	Services	920601058. 3	support seawater research facility		0.

Total number of ideas for category: 43 Total cost of ideas (in thousands) for Category: 0.

TOTAL COST OF ALL IDEAS (in thousands): 600090.

11.1.8 D

July 15, 1992•

Trustee Council Nominations for Public Advisory Group Members

SPECIAL INTEREST	*NUMBER OF NOMINATIONS*
Aquaculture	
John McMullen	6
Kenneth Adams	4
Douglas Coughenower	2
Floyd Heimbuch	1
Jack Van Hyning	1
Karl Pulliam	1
Commercial Fishing	
Gerald McCune	6
Kenneth Adams	4
Craig Matkin	4
Douglas Coughenower	1
Donna Fischer	1
John French	1
Commercial Tourism	
Bradford Phillips	5
Carl Cox	4
James Lethcoe	3
Diane McBride	2
Donna Fischer	1
John Merrick	1
Jules Tileston	1
Conservation	
James King	5
James Diehl	3
Jules Tileston	3
John Merrick	2
Calvin Lensink	1
Craig Matkin	1
Walter Parker	1

Environmental

Pamela Brodie 6
James Diehl 2
James King 2
Nancy Lord 2
Jules Tileston 2
Geoffrey Parker 1
Craig Matkin 1

Forest Products

John Sturgeon 6
John Merrick 5
Gail Evanoff 1

Local Government

Donna Fischer 5
Jerome Selby 5
Gail Evanoff 1
Karl Pulliam 1

Native Landowners

Charles Totemoff 5
John Merrick 4
Richard Knecht 3
Gail Evanoff 2

Recreation Users

James Diehl 5
Jules Tileston 4
James Lethcoe 2
Douglas Coughenower 1
James King 1
John Merrick 1
Charles Totemoff 1

Science/Academic

John French 6
Calvin Lensink 5
Craig Matkin 3
Douglas Coughenower 1

Sport Hunting/Fishing

James King 3
Geoffrey Parker 3
John Merrick 2
Jerome Selby 2
Calvin Lensink 2
Douglas Coughenower 1
Karl Pulliam 1

Subsistence

Charles Totemoff 6
Richard Knecht 5
Gail Evanoff 1
John French 1

Public At Large

Karl Pulliam 4
Donna Fischer 3
James Diehl 2
Walter Parker 2
Bradford Phillips 2
Carl Cox 1
Floyd Heimbuch 1
James King 1
Craig Matkin 1
John Merrick 1
Diane McBride 1
Jules Tileston 1

REPRESENTATIVE
BEN GRUSSENDORF
1221 HALIBUT POINT ROAD
[illegible]A, ALASKA 99835
[illegible]07] 747-8458
[illegible]LES COMMITTEE
LEGISLATIVE COUNCIL

DISTRICT 3
ELFIN COVE
PELICAN
PORT ALEXANDER
SITKA
TENAKEE

Alaska State Legislature

WHILE IN JUNEAU
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House of Representatives
SPEAKER OF THE HOUSE

Document ID Number
920630334
☐ A-92 WPWG
☐ B-93 WPWG
☐ C-RPWG
☑ D-PAG
☐ E-MISC.

June 23, 1992

Mr. L. J. Evans
Exxon Valdez Oil Spill Settlement Trustee Council
645 "G" Street
Anchorage, Alaska 99501

Dear Mr. Evans:

The Exxon Valdez Trustees have called for the appointments of the legislative members to the Exxon Valdez Oil Spill Public Advisory Group to advise the Trustee Council on decisions relating to the planning, evaluation and conduct of injury assessment and restoration activities. I am appointing Rep. Cliff Davidson as the member from the House of Representatives to the Advisory Group, to serve in an ex-officio, non-voting capacity. Rep. Davidson is knowledgeable about the effects of the spill as well as the potential for meaningful mitigation of the effects of this tragedy. I feel he will be an asset to the Council in its deliberations.

We appreciate the difficult task ahead for the Council and the opportunity to provide to the Advisory Group the services of such a highly qualified individual. Please do not hesitate to call or to write if you need further information or if I may be of assistance in any way.

Sincerely,

Rep. Ben Grussendorf

cc: Trustee Council Members

Alaska State Legislature

SENATOR RICHARD I. ELIASON

President of the Senate

P.O. Box V
Juneau, Alaska 99811
(907) 465-3755

July 10, 1992

Mr. Dave Gibbons, Interim Director
Exxon Valdez Restoration Office
645 G Street
Anchorage, Alaska 99501

Dear Mr. Gibbons,

It is my pleasure to appoint Senator Jay Kerttula as an ex-officio member to the Public Advisory Group of the Exxon Valdez Oil Spill Settlement Trustee Council. I am sure that Senator Kerttula will be a very valuable asset to the membership of this group.

Good luck with your endeavors.

Sincerely,

Senator Dick Eliason, President
Alaska State Senate

cc: Senator Jay Kerttula

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178

11.1.8 C

TO: Trustee Council
EXXON Valdez Restoration Program

DATE: 14 July 1992

FROM: Restoration Team
Jerome Montague
Chair
1993 Work Plan Work Group

SUBJECT: 1993 Work Plan

Attached are the assumptions and procedures for development of the 1993 Work Plan, as modified in response to comments received during the Trustee Council meeting of 29 June. This packet is composed of the following elements:

	PAGE
1. 1993 Work Plan Assumptions.	1
2. 1993 Work Plan Development Schedule.	3
3. Project Evaluation Factors.	8
4. Project Selection Process.	13
5. Format for Project Descriptions.	17

Attachment

DRAFT ASSUMPTIONS FOR SCHEDULING AND PREPARING THE DRAFT 1993 WORK PLAN

It is necessary to have a budget prepared for all Federal Fiscal Year 1993 activities no later than August 31, 1992, to get it to the Federal Office of Management and Budget 30 days prior to 1 October. To prepare a suitable budget with an appropriate degree of accuracy, it will be necessary to have at least an approved draft 1993 Work Plan.

2. Since the Restoration Plan will only be completed in draft form before the 1993 Work Plan is finalized it seems advisable to take a conservative approach to the scope of the 1993 program. Nevertheless process should not become more important than the goals of restoration, hence a program is anticipated with important projects in all categories of damage assessment, restoration and technical support projects. Preliminary review of public and agency ideas for the 1993 Work Plan indicate interest in all the subject areas listed above.

3. We anticipate the following emphasis in selecting projects for 1993:

Damage Assessment: Damage assessment closeout projects should remain the highest priority as we continue toward completion of this stage of the process. New and continued damage assessment projects should again be limited to further evaluating injury that is not understood to a degree necessary to provide restorative action or to document new injury. The number of projects in this category should be greatly reduced as compared to that in the 1992 Work Plan.

Restoration Monitoring: Since many projects in this category were deferred from 1992 to 1993 or later years, it is possible that more projects would be conducted in 1993 than the four in 1992.

Restoration Manipulation and/or Enhancement: We assume there will be more projects in this category than the one proposed in the 1992 plan.

Restoration Habitat Protection and/or Acquisition: We anticipate continuation or wrap-up of the three 1992 information gathering projects, if they have not already been completed. Identifying important habitats and habitat-related services will be a high priority for 1993 and new projects are anticipated. There were no acquisition projects in 1992. Although there is much public support for habitat acquisition projects, we are proposing a pragmatic approach to fully develop the process in 1993, but not to acquire any habitats except perhaps those facing imminent threat.

Restoration Management Actions: This was the largest category of restoration projects in 1992. We believe it will also be a major component of the restoration portion of the 1993 plan.

Technical Support: We anticipate that there will be projects in this category with the number and scope being in direct proportion to the number and scope of all other categories.

The greater demands and restoration needs in 1993 could well result in a program of broader scope than last year.

5. The 1993 draft work plan and estimated budget will include all projects including the Restoration Team, Administrative Director etc.

6. The Trustee Council recognizes that there is strong public support for habitat protection / acquisition projects, and the 1993 Work Plan should include projects to evaluate critical habitats. The Trustee Council may move to protect critical habitats in 1993. This could include habitats that are not under imminent threat of development.

1993 Work Plan Development Schedule

DATE	MILESTONE AND/OR ACTIVITY
Apr 92	Restoration Team develops format for project ideas from public; Restoration Team reviews 1993 planning outline.
27 Apr 92	Trustee Council approves project idea format; Trustee Council approves schedule for 1993 Work Plan through June 30.
1 May 92	Send letter to the public requesting project ideas. Request project ideas from agencies.
May-Jun 92	Develop factors for ranking 1993 projects and develop procedures for choosing lead agency.
May-Sep 92	Preparation of draft 1993 Work Plan.
May 92	Request project ideas from public during scoping meetings.
15 Jun 92	Finalize factors for ranking 1993 projects; finalize brief project description format. Deadline for receipt of ideas from the public and agencies. Lead agencies begin writing brief project descriptions for high-priority projects at their discretion.
5 Jun-12 Jul 92	Public and agency project ideas sorted and coded; unsolicited proposals sorted and coded as project ideas, undergo critical factor evaluation to eliminate fatally flawed projects. Lead agencies identified.
22 Jun 92	Approach to unsolicited proposals developed.
29 Jun 92	Present 1993 Work Plan development assumptions, procedures, and brief project description format to Trustee Council.
1 Jul 92	Restoration Team begins preparing Administrative Director and Restoration Team budgets. Restoration Team prepares 1993 Work Plan mission statement.
2 Jul 92	Technical Review Committee defined.
2-13 Jul 92	1993 Work Plan Work Group consolidates and quality controls project spreadsheets; prepares brief status report. Legal review made of rejected project ideas.
10 Jul 92	Update of 1993 work plan spreadsheet distributed to Finance Committee, Restoration Team, and Trustee Council.
13-15 Jul 92	Restoration Team ranks project ideas and selects those that will result in brief (3-page) project descriptions.

16-31 Jul 92	Lead agencies and Habitat Protection Work Group write brief project descriptions for selected projects and evaluate environmental compliance needs for each project.
20 Jul 92	Trustee Council meets to discuss spreadsheet (continuation of June 29 meeting).
3 Aug 92	Trustee Council meets by teleconference.
4-7 Aug 92	Technical review by Chief Scientist, peer reviewers, agency technical experts, and Restoration Team to further rank projects for 1993 Work Plan.
7 Aug 92	Restoration Team meets to provide guidance to 1993 Work Plan Work Group on preparing 1993 Work Plan rough draft.
7-14 Aug 92	Complete proposed draft of 1993 Work Plan and estimated budget in response to guidance from the Restoration Team and deliver to Restoration Team
17 Aug 92	Restoration Team reviews and approves draft plan; Finance Committee reviews budgets.
18-24 Aug 92	1993 Work Plan Work Group compiles draft 1993 Work Plan including Administrative Director and Restoration Team budgets which are provided to the Restoration Team and Finance Committee.
25 Aug 92	Restoration Team delivers draft plan to Trustee Council.
31 Aug 92	Trustee Council meeting to approve draft 1993 Work Plan and estimated budget for 30 day public review. Draft 1993 Work Plan and estimated budget completed incorporating changes from Trustee Council.
1 Sep 92	Budget estimate is sent to State and Federal Offices of Management and Budget.
15 Sep 92	Finalize format for detailed project descriptions and proposals written in response to requests for proposals.
1 Oct 92	Draft 1993 Work Plan released for public comment. Ensure 1992 preliminary results are incorporated into the decision process.
1 Oct 92-1 Jan 93	Lead agencies prepare requests-for-proposals for work to be contracted; prepare detailed work plans for projects to be done by agencies.
1 Nov 92	Comments (public, chief scientist, peer reviewers, Public Advisory Group, 1992 principal investigators, and agency) on draft 1993 Work Plan due.
1 Dec 92	Trustee Council determines 1993 Work Plan modifications. Agencies begin procurement for approved projects to be contracted. Request 1993 project funds from court.
31 Dec 93	Receive funds from court.

Jan-Jun 93	Project implementation by lead agencies.
Feb 94	Draft 1993 final reports due. Draft reports sent out for review.
1 Mar 94	Review comments returned to principal investigators.
1 Apr 94	Final and annual reports of 1993 projects due.

TRUSTEE COUNCIL RECOMMENDATIONS ON THE SCHEDULE FOR PREPARATION OF THE 1993 WORK PLAN

1. Approves schedule and assumptions.

2. Approves schedule and assumptions with the following changes:

3. Does not approve schedule.

ID Number_____

Date_____

INITIAL RESTORATION TEAM REVIEW OF 1993 PROJECT IDEAS

Critical Factors

Yes	No	Unknown	
___	___	___	1. Linkage to resources and/or services injured by the Exxon Valdez oil spill.
___	___	___	2. Technically feasible.
___	___	___	3. Consistent with applicable Federal and State laws and policies.

Yes	No	Damage Assessment Ideas
___	___	1. Project previously funded for close-out.
___	___	2. 1993 close-out project.
___	___	3. New project where injury is apparent.
___	___	4. Damage assessment continuation.

Yes	No	General Restoration Ideas
___	___	1. Is there a restoration end-point?
___	___	2. Time critical to the recovery of the injured resource/service; must be conducted in 1993.
___	___	3. Opportunity lost if not funded in 1993. (Related to method of recovery.)
___	___	4. Involves long-term commitment.

Recommendation

___ Approved for preparation of brief project description.
___ Rejected.
___ Combined with ideas: _____

Comments:

1993 PROJECT EVALUATION FACTORS

Damage Assessment

These factors will be considered when applying best professional judgement to evaluate these projects. The purpose is to simply rank the project into categories of "high", "medium" and "low" priority.

1. The effects of any other actual or planned restoration actions.*
2. Potential to improve the rate or degree of recovery.*
3. Potential adverse effects on human health and safety.*
4. Relationship of expected costs of the proposed actions to the expected benefits.*
5. Cost effectiveness.*
6. Potential for additional injury resulting from proposed actions, including long-term and indirect impacts.*
7. Importance of starting the project within the next year.*

There is reason to believe that there is continuing injury to the resource and/or service, but the extent and/or mechanism is not understood.**

RANK: __ HIGH __ MEDIUM __ LOW

___ Approved for preparation of brief (3-page) project description.

___ Rejected.

Comments:

* Restoration Framework, 1992, pp 43-44.

** The 1991 State/Federal Natural Resources Damage Assessment and Restoration Plan for the Exxon Valdez Oil Spill. 1991, vol. 1, p.1 (paraphrased).

1993 PROJECT EVALUATION FACTORS

Restoration Manipulation and/or Enhancement

These factors will be considered when applying best professional judgement to evaluate these projects. The purpose is to simply rank the project into categories of "high", "medium" and "low" priority.

1. The effects of any other actual or planned restoration actions.*
2. Potential to improve the rate or degree of recovery.*
3. Potential adverse effects on human health and safety.*
4. Relationship of expected costs of the proposed actions to the expected benefits.*
5. Cost effectiveness.*
6. Potential for additional injury resulting from proposed actions, including long-term and indirect impacts.*
7. Importance of starting the project within the next year.*
8. Degree to which the proposed action enhances the resource or service.*
9. Degree to which the proposed action benefits more than one resource or service.*

___ Approved for preparation of brief (3-page) project description.

___ Rejected.

RANK: __ HIGH __ MEDIUM __ LOW

Comments:

Restoration Framework, 1992, pp 43-44.

1993 PROJECT SCORING SHEET

Restoration Management Actions

These factors will be considered when applying best professional judgement to evaluate these projects. The purpose is to simply rank the project into categories of "high", "medium" and "low" priority.

1. The effects of any other actual or planned restoration actions.*
2. Potential to improve the rate or degree of recovery.*
3. Potential adverse effects on human health and safety.*
4. Relationship of expected costs of the proposed actions to the expected benefits.*
5. Cost effectiveness.*
6. Potential for additional injury resulting from proposed actions, including long-term and indirect impacts.*
7. Importance of starting the project within the next year.*
8. Degree to which the proposed action enhances the resource or service.*
9. Degree to which the proposed action benefits more than one resource or service.*

RANK: __ HIGH __ MEDIUM __ LOW

___ Approved for preparation of brief (3-page) project description.

___ Rejected.

Comments:

Restoration Framework, 1992, pp 43-44.

1993 PROJECT EVALUATION FACTORS

Restoration Monitoring

These factors will be considered when applying best professional judgement to evaluate these projects. The purpose is to simply rank the project into categories of "high", "medium" and "low" priority.

1. The effects of any other actual or planned restorationactions.*
2. Potential to improve the rate or degree of recovery.*
3. Potential adverse effects on human health and safety.*
4. Relationship of expected costs of the proposed actions to the expected benefits.*
5. Cost effectiveness.*
6. Potential for additional injury resulting from proposed actions, including long-term and indirect impacts.*
7. Importance of starting the project within the next year.*
8. There is reason to believe that the injury to the resource and/or service is not restored, but the rate, and extent, and/or mechanisms are not yet understood.**

RANK: __ HIGH __ MEDIUM __ LOW

___ Approved for preparation of brief (3-page) project description.

___ Rejected.

Comments:

* Restoration Framework, 1992, pp 43-44.
** The 1991 State/Federal Natural Resources Damage Assessment and Restoration Plan for the Exxon Valdez Oil Spill. 1991, vol. 1, p.1 (paraphrased).

1993 PROJECT EVALUATION FACTORS

Technical Support

These factors will be considered when applying best professional judgement to evaluate these projects. The purpose is to simply rank the project into categories of "high", "medium" and "low" priority.

1. The effects of any other actual or planned restoration actions.*
2. Potential to improve the rate or degree of recovery.*
3. Potential adverse effects on human health and safety.*
4. Relationship of expected costs of the proposed actions to the expected benefits.*
5. Cost effectiveness.*
6. Potential for additional injury resulting from proposed actions, including long-term and indirect impacts.*
7. Importance of starting the project within the next year.*

The project provides essential support to restoration, monitoring, and/or damage assessment projects.

RANK: __ HIGH __ MEDIUM __ LOW

___ Approved for preparation of brief (3-page) project description.

___ Rejected.

Comments:

Restoration Framework, 1992, pp 43-44.

1993 Project Selection Process
Exxon Valdez Oil Spill Restoration

Receipt of ideas (by 19 June 92)

A. Ideas are received and stored at Simpson Building. Sources:

1. One-page idea forms sent by agencies and public by 6-15-92.

2. Written suggestions sent in response to 1992 Work Plan and Restoration Framework, or in general correspondence.

3. Unsolicited proposals sent by 6-15-92.

II. Sorting and grouping of ideas (15 June - 12 July 92)

A. Ideas received are sorted by category:

1. Damage Assessment
2. Restoration Monitoring
3. Restoration Manipulation and/or Enhancement
4. Restoration Habitat Protection and/or Acquisition
5. Restoration Management Actions
6. Technical Support

B. Similar ideas are grouped together, as appropriate, into one idea form.

III. Critical factors applied to ideas (by 12 July 92)

A. The ideas are examined by the 1993 Work Plan Work Group and compared to the Critical Factors--the ideas will either be rejected or accepted for further evaluation by technical committees (see below).

IV. Lead Agencies designated (by 12 July 92)

A. Lead Agencies are designated for each idea.

B. Acquisition ideas are designated for the Habitat Protection Work Group.

C. Endowment ideas directed to Endowment Work Group.

V. Update on 1993 Work Plan (by 13 July 92)

A. 1993 Work Plan Work Group prepares a brief status report and a summary spreadsheet of non-rejected and rejected ideas and sends to the Restoration Team for review and comment; modifications are made, if required.

VI. Restoration Team Ranks Project Ideas (13-15 July 92)

A. Restoration Team ranks project ideas and selects those to be sent to lead agencies for preparation of brief (3-page) project descriptions.

VII. Brief project descriptions and budgets prepared (16-31 July 92)

A. Ideas are sent to the Lead Agency or Habitat Protection Work Group (for habitat-related projects) or Endowment Work Group (for endowment projects) for further refinement and preparation of a brief project description (see project description format).

B. The Environmental Compliance Work Group assists Lead Agencies, if required, in preparing the environmental compliance section of the project description. The Environmental Compliance Work Group reviews environmental compliance sections for adequacy.

C. Lead Agencies, Habitat Protection Work Group, and Endowment Work Group send completed project descriptions to the 1993 Work Plan Work Group, which sends them to the Technical Review Committees.

VIII. Ranking of project descriptions (4-7 August 92)

A. A Technical Review Committee is convened with suitable expertise:

1. 1993 Work Plan Work Group Chair and members;
2. Restoration Team;
3. The Chief Scientist and appropriate Peer Reviewers
4. Other qualified Trustee agency persons

B. Technical Review Committee uses best professional judgement to rank projects.

C. Recommendations for the relative ranking of projects within categories are sent to the 1993 Work Plan Work Group.

D. Restoration Team meeting to provide guidance to 1993 Work Plan Work Group in preparing rough draft of the 1993 Work Plan.

IX. 1993 Work Plan drafted (7-14 August 92)

A. The 1993 Work Plan Work Group takes Trustee Council and Restoration Team guidance and information and combines with project descriptions into the draft 1993 Work Plan. Projects will be included as follows:

1. Recommended project descriptions will be in the body of the plan.
2. Project descriptions not recommended will be included as an appendix.
3. Rejected ideas will be listed as an appendix.

B. The draft 1993 Work Plan is sent to the Finance Committee for review and comment.

C. The draft 1993 Work Plan is sent to the Restoration Team for review and comment.

D. Modifications, if required, are made to the draft 1993 Work Plan.

X. 1993 Work Plan finalized (17-31 August 92)

A. The draft 1993 Work Plan is sent to the Trustee Council for review and authorization to go out for public review.

B. The draft 1993 Work Plan is sent out for 30-day public review.

C. Modifications and a final review by the Restoration Team, if required, are made and the 1993 Work Plan is submitted to the Trustee Council for approval.

1. Approves the use of the Selection Process as a procedural guideline.

2. Approves the use of the Selection Process as a procedural guideline with the following changes:

3. Does not approve the use of the Selection Process as a procedural guideline.

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

645 G Street
nchorage, Alaska 99501
07/278-8012

BRIEF PROJECT DESCRIPTIONS
Instructions and Forms

Complete the attached project description form (instructions below). Be brief--only present enough information so that decisions can be made on the merit of the project--the project description cannot be longer than three pages in length, excluding cost forms. The accepted project descriptions will be used, as presented, in the Annual Work Plan, which will be available for public review. Camera-ready project descriptions, therefore, are requested. Use WordPerfect 5.1, Universal (scalable) font, 11 point. The cost forms are in Excel. These forms can be submitted in on an IBM-compatible 3.25" high-density diskette. A diskette containing these forms is available from the Restoration Team.

NOTE: Proprietary information should not be divulged unless the person or organization submitting information desires to make it public.

I. TRANSMITTAL

fix a transmittal letter to the front of the project description and include the name, affiliation, ddress, and telephone number of the person who may be contacted regarding the project.

II. BASIC INFORMATION

Project Source--leave blank.

Project Number--leave blank.

Project Title--concise descriptive name of the project.

Project Category--the project should fall into one of these categories: damage assessment, management actions, restoration manipulation and enhancement, restoration monitoring, habitat protection and acquisition, or technical support.

Lead Agency--name of the lead State or Federal agency submitting or sponsoring the project (if unknown, leave blank).

Cooperating Agencies--name of any State or Federal agencies cooperating in the project (if unknown, leave blank).

Project Term--the start date and estimated finish date of the project.

III. INTRODUCTION

A. Background on the Resource/Service--Briefly describe the resource/service targeted by this project.

Summary of Injury--Describe the nature of the injury to the resource/service caused by the *T/V Exxon Valdez* oil spill.

C. Location--Identify where the project will be undertaken and where the project's benefits will be realized. Identify areas or communities that may be affected by the project.

IV. WHAT

A. Goal--Define the overall purpose (goal) of the project.

B. Objectives--List the specific objectives of the project. These should be concise statements of measurable results that will achieve the stated goal. If more than one organization is to be funded for work on the project, identify the objectives for each participant.

V. WHY

A. Benefit to Injured Resources/Services--Describe why this project is beneficial to the restoration of injured resources/services and how the project will help restore, enhance, replace, or provide a substitute for these resources/services.

B. Relationship to Restoration Goals--Explain why the Trustees should fund this project. (When e Restoration Plan is completed, explain how this project will help to meet one or more of the stated oals. See Restoration Framework for further information.)

VI. HOW

A. Methodology--Describe how this project will achieve its stated results. Describe the study methods and data analysis processes and the tasks of each participant. Enough detail must be given on methodology so that informed reviewers can evaluate this proposal.

B. Coordination with Other Efforts--Explain how this project will relate to previous or other efforts of a similar nature or in the area of interest.

VII. ENVIRONMENTAL COMPLIANCE

All projects must comply with the requirements of the National Environmental Policy Act. There are three possible categories to be determined by the Lead Agency or the Environmental Compliance Working Group: 1) the proposed project qualifies for a categorical exclusion; 2) an environmental assessment is required, which may result in a "finding of no significant impact"; or an environmental impact statement is required. The environmental assessment may be included here, or it and/or the environmental impact statement may be scheduled and budgeted for as part of the project proposal. (Refer to the programmatic environmental impact statement for the Restoration Plan, when completed.) Other Federal and State environmental laws, such as the Endangered Species Act or Alaska Coastal Management Act, may need to be addressed for approval of the project.

VIII. WHEN

Outline the project's proposed schedule of major events and milestones, the time involved, and the completion date of each stage, including environmental compliance.

IX. COST

For the funds requested from the Trustee Council, complete the attached budget forms for the project. On a separate sheet, note the total amount to be spent if other funding is being supplied or sought, and what the source of the other funding is. Every project requires completion of Forms 2A and 2B. Include amounts for each budget category for the next two fiscal years of the project (FY93 and FY94), and estimate total amounts for each of the following years, if this is a multi-year project. If the project funding will be allocated among different organizations, then Forms 3A and 3B must be used for each organization's portion of the project funding, the total for the project is then described in Forms 2A and 2B. The categories used in the forms are described below:

Personnel--Salaries, benefits and related costs for personnel.

Travel--Transportation (ground, air, water) and per diem.

Contractual--Subcontracts with other organizations/vendors, office/lab equipment rental, telephone/fax, computer processing.

Commodities--Office and lab supplies, postal expenses, books and publications.

Equipment--Property such as lab equipment, computers, machinery (personal property).

Capital Outlay--Acquisition of land or buildings (real property).

General Administration--Overhead or indirect costs, such as office space, office utilities, fixed telephone charges, and all normal organization services for administering procurement, personnel, payroll, accounting, auditing and so on. There are two types of general administration costs that may be incorporated into project budgets:

(1) For agencies: 15 percent of the project's direct personnel cost, not to exceed a total of $50,000 for all an agency's projects.

(2) For contracts: Up to 7 percent of the first $250,000 of the project's contract costs, plus 2 percent of project contract costs in excess of $250,000.

Full Time Equivalents--One person full time for 12 months equals 1 FTE, one person full time for 6 months equals .5 FTE, etc.

Fiscal Year--The fiscal year is January 1, 1993 through September 30, 1993.

Form 2A, Project Detail

Prepare a brief project description. If the project was funded in FY92, indicate those amounts in the last two columns. Itemize expenses by budget category for the upcoming two years (FY93 and

FY94). If the project will continue past FY94, include estimated totals for each subsequent year (FY95-FY97). If the project will continue past the years identified on the form, put the subtotal for all other out-years (FY98-FY01) in the last column. Identify the positions to be funded.

Form 2A, Project Detail (Narrative)

Provide a brief narrative explanation of the items included in each budget category for FY93. Identify any contracts to be issued and their estimated amounts.

Form 3A, Sub-Project Detail

Same as 2A, but complete a form for each individual organization receiving funding for this project, if more than one.

Form 3A, Sub-Project Detail (Narrative)

Same as 2B, but complete a form for each individual organization receiving funding for this project, if more than one.

EXXON VALDEZ OIL SPILL BRIEF PROJECT DESCRIPTION

Project Number:

ct Source:

Project Title:

Project Category:

Lead Agency:

Cooperating Agencies:

Project Term:	**Start Date:** (day/month/year)	**Finish Date:** (day/month/year)

INTRODUCTION:

Project Number:

WHAT:

WHY:

Project Number:

HOW:

ENVIRONMENTAL COMPLIANCE:

WHEN:

11.1.8 B

I. Cover Page

STATE/FEDERAL NATURAL RESOURCE DAMAGE ASSESSMENT

Revised Study Plan for Sept 1, 1992 to Feb 28, 1993

Project Title:	Sockeye Salmon Overescapement (Enhanced Plankton Study)
Study ID Number:	Fish/Shellfish Study No. - 27 Supplement
Proposal Cost:	$47 K
Lead Agency:	State of Alaska, ADF&G; FRED Division
Cooperating Agency:	Federal: U.S. Fish and Wildlife Service
Principal Investigator:	Dr. Dana Schmidt
Assisting Personnel:	Gary Kyle Jim Edmundson John Edmundson Pat Shields Virginia Litchfield Gary Todd
Date Submitted:	July 5, 1992

Title	Signature	Date
Principal Investigator:		7/15/92
Reseach Sup.	/s/ for Robert D Burkett	7/15/92
OSIAR Program Manager:	Joseph R. Sullivan	7/15/92

I. Cover Page

STATE/FEDERAL NATURAL RESOURCE DAMAGE ASSESSMENT

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Date Submitted:	July 5, 1992

II. INTRODUCTION

This study is a supplement to the oil spill damage assessment program initiated in 1990. Recent findings have suggested major economic damage to commercial, subsistence, and sport fisheries may result because of the over-escapement event occurring associated with fisheries closures caused by the 1989 oil spill. The supplemental program comprises significant modifications to the sampling of zooplankton, the major food source of sockeye juveniles. This proposed investigation is supplemental to the previously submitted studies. This supplemental program is necessary because of unexpected findings in the collection of zooplankton and fry distribution data from the Kenai Peninsula lakes during the spring of 1992.

Commercial fishing for sockeye salmon in 1989 was curtailed in upper CI, the outer Chignik districts, and the Kodiak areas due to presence of oil in the fishing areas from the EVOS. As a result, the number of sockeye salmon entering four important sockeye producing systems (Kenai/Skilak, Chignik/Black, Red, and Frazer Lakes) and two less important lake systems (Akalura and Afognak or Litnik lakes) greatly exceeded levels that are thought to be most productive. Sockeye salmon spawn in lake-associated river systems. Adult salmon serve an extremely important role in the ecosystem by providing food for marine mammals, terrestrial mammals, and birds. Additionally, carcass decomposition serves to charge freshwater lake systems with important nutrients. Juvenile salmon which rear in lakes for one or two years serve as a food source for a variety of fish and mammals. Sockeye salmon are also an important subsistence, sport, and commercial species. The ex-vessel value of the commercial catch of sockeye from these lake systems has averaged about $42 million per year since 1979, with the 1988 catch worth $115 million. Sockeye salmon returns to the Kenai River system support some of the largest recreational fisheries in the State.

Overly large spawning escapements may result in poor returns by producing more rearing juvenile sockeye than can be supported by the nursery lake's productivity (Kyle et al. 1988). In general, when rearing fish abundance greatly exceeds the lake's carrying capacity, prey resources are altered by changes in species and size composition (Mills and Schiavone 1982, Koenings and Burkett 1987, Kyle et al. 1988) with concomitant effects on all trophic levels (Carpenter et al. 1985). Because of such changes, juvenile sockeye growth is reduced, mortality increases, larger percentages holdover for another year of rearing; and the poor quality of smolts increases marine mortality. Where escapements are two to three times normal levels, the resulting high juvenile densities crop the prey resources to the extent that more than one year is required to return to normal productivity. Rearing juveniles from subsequent brood-years suffer from both the poor quality of forage and from the increased competition for food by holdover juveniles (Townsend 1989; Koenings and Kyle 1991). This is the brood-year interaction

underlying cyclic variation in the year class strength of anadromous fish.

Smolt enumerations and fall fry estimates during 1991 and the spring of 1992 have produced very low numbers, compared with earlier years data. However, zooplankton biomass estimates in Skilak Lake, the major sockeye salmon producer, has not undergone similar levels of decline. To further understand the mechanism that may regulate the survival of sockeye salmon juveniles in this lake, early spring tow netting for juvenile salmon was conducted. Failure to collect significant numbers prompted limited distribution studies of juvenile sockeye in the lakes by use of sonar. These data indicated concentrations during the day near 40 meters but in very low abundances (personal comm., Ken Tarbox). These findings prompted limited vertical sampling of the zooplankton community to determine depth distribution. During the day, most of the zooplankton biomass was concentrated at the same depth as the fish with apparently increased surface concentrations during the night. Since light extinction during the spring occurred near 15 meters in this lake and the lake was isothermal at 2.5 degrees C, this distribution pattern seemed peculiar. Since sockeye salmon are principally sight feeders, this would mean that much of the biomass would be unavailable for feeding. The control lake, Tustumena, indicated that the same species of zooplankton did not exhibit a similar vertical distribution. Pearre(1979) and Enright(1977) discussed possible causative mechanisms of various patterns of vertical distribution. One possible mechanism that would explain the difference is food satiation. By having heavy cropping of the zooplankton community, the zooplankton respond by no longer competing for limited food resources and are able to sustain sufficient nutrition with relative minor amounts of time at the depths that produce phytoplankton. At these depths they are also susceptible to sight feeding predators (sockeye salmon). Thus although the high turbidity and cold temperatures of Tustumena produce more limited biomass of zooplankton, their continual presence in the surface light layer makes them much more vulnerable to feeding sockeye. We are also examining if the egg bearing component of the population of zooplankton is being cropped at higher rates and may be a major loss of needed lipids for overwintering survival of sockeye juveniles.

To test these hypotheses, much more intensive sampling of the diel and seasonal distribution of plankton in the glacial lakes of the Kenai Peninsula is required. Although these could be completed by increased sampling with vertical plankton tows, the costs would be prohibitive if an accurate map of the temporal and vertical presence of zooplankton were to be obtained. Therefore we have proposed to use a towable optical zooplankton counter. This device has been developed by Focal Technologies Inc. and allows in situ counting of zooplankton and obtains estimates of their length frequency distribution. Because of the limited number of species and size distribution, we believe this device would provide an effective method of obtaining this data. Because this device has had limited use in freshwater and has had no use in glacial

conditions, the application has some risks of failure. However, recent modifications to the device which should allow its use in high turbid water conditions suggest it would be effective under our conditions.

III. OBJECTIVES

A. Estimate the seasonal, diel, and vertical distribution of zooplankton species which are the known prey of sockeye salmon in Skilak, Kenai, and Tustumena Lake

B. Estimate the seasonally available biomass in these lakes and the relationship of this biomass to ambient temperature and light.

C. Determine if biomass of zooplankton within thermal and visual feeding constraints limit the growth and survival of juvenile sockeye and if the observed results are consistent with the hypothesis that over cropping of the zooplankton causing decreased food availability for high abundances of sockeye salmon juveniles.

IV. METHODS

During the open-water season, zooplankton abundance and distribution will be estimated in Skilak, Kenai and Tustumena lakes. A minimum of four sampling periods will be sampled and will consist of an early spring sampling period prior to smolt outmigration, an early summer period, a late summer period, and a pre-freeze up sampling period.

Sampling will be performed along the transects established for fall fry fish sonar estimates in these lakes. Sampling depths will vary from the surface to the lower established limits of significant zooplankton biomass. The species composition will be estimated using vertical net plankton tows representative of the area sampled by the optical plankton counter. Sample size numbers will be determined empirically by determination of variance from a subset of the initial samples collected by the vertical tows. Species or life stage composition of zooplankton in the optical tow counts will be determined by statistical mode analysis of the length frequency of the net samples and the similar information obtained from the optical counters.

For each lake, diel migration will be estimated at one location. This will involve continuously sampling with the towable counter and varying depths for one 24 hour cycle.

The above data will be integrated with the other information including chlorophyll a information to provide a 3-dimensional temporal map of zooplankton biomass. This will be used in developing a seasonal model of food availability within the photic

zone of the lake and compared with fish biomass production from these systems.

The studies will begin in late summer (September, 1992) and continue through a minimum of one calendar year.

VIII. Budget

Line 100. Personnel PCN 5271, FBI
1.25 mm = $5 K
PCN 5187, FBI
1.25 mm = $5 K

Total Line 100 = $10 K

Line 400

Miscellaneous fabrication equipment and supplies
$2 K
Total Line 200 = $2 K

Line 500

Focal Tech. Optical Plankton Counter with winch, tow sled, cabling, depth sensor, data recorder, software, ,mounting hardware, and custom modifications. $35 K

Total Line 500 = $35 K

Total all lines= $47 K

IX. Personnel Qualifications

Principal Investigator

Dr. Dana Schmidt, Principal Limnologist, Soldotna, AK.

Dr. Schmidt is the principal limnologist at the Soldotna laboratory and will be the primary author of limnological investigations on the Kenai Peninsula. Dr. Schmidt has been the Regional Research Biologist for the Commercial Fisheries Division of the Alaska Department of Fish and Game in Kodiak over the past 6 years. As he was co-principal investigator in the past with Dr. Koenings, he is particularly suited for continuing in this role.

Other staff
Numerous other staff of ADF&G provide assistance in completing these studies.
Primary staff include:
Project Biometrician: Vacant,
Kenai Peninsula Limnology study field investigations: Gary Kyle
Kenai Peninsula Water quality and zooplankton laboratory investigation: Jim Edmundson
Plankton analysis, John Edmundson, Fisheries Biologist, Soldotna Limnology Laboratory
Field Data Collection and laboratory analysis. Gary Todd, Virginia Litchfield and Pat Shields, Soldotna Limnology Laboratory

Exxon Valdez Oil Spill Trustee Council

Restoration Office
645 "G" Street, Anchorage, AK 99501
Phone: (907) 278-8012 Fax: (907) 276-7178

11.1.84

To: The Trustee Council

Thru: David Gibbons,
Acting Administrative Director
Restoration Team

From: Jerome Montague
Alaska Dept. of Fish and Game

Subject: Detailed Study Plans and Budgets For Add-ons to FS 27 and R60C Approved by the Trustee Council on June 28, 1992

At the Trustee Council meeting on June 29, 1992, requests were made for additional 1992 funds for Fish/Shellfish Damage Assessment Study 27 (Sockeye Salmon Overescapement) and Restoration Project 60C (Injury to Salmon Eggs and Pre-emergent Fry). These requests were in addition to the budgets originally approved for these projects by the Trustee Council on February 28. The Trustee Council approved these additional requests. The detailed study plans and budgets are attached.

The plan for the enhanced plankton portion of Fish/Shellfish 27 describes only that aspect of the study which is supported by the additional $47,000 approved on June 29.

The budget for the laboratory verification of injury to salmon eggs and pre-emergent fry includes the additional $103,000 authorized on June 30 and $150,000 which constituted the original laboratory portion of the $389,800 budget for this project authorized on February 28. Though the original laboratory allocation for that portion of this study did envision a multi-year project, the investigators will be able to obtain useful information from each year this is funded, even if the project is not funded for its entire projected life. The additional $103,000 authorized June 29 will be used to perform intrastream crosses as suggested by Chief Scientist Bob Spies in order to investigate geographic effects unrelated to oil. It will be necessary to perform this portion of the laboratory study only one year in order to obtain the desired information.

RESTORATION SCIENCE STUDY PLAN

Project Title:	INJURY TO SALMON EGGS AND PRE-EMERGENT FRY IN PRINCE WILLIAM SOUND - LABORATORY VERIFICATION
Study ID Number:	Restoration Study Number 60C - Part 2
Lead Agency:	State of Alaska, Department of Fish and Game, Division of Commercial Fisheries
Cooperating Agency(ies):	Federal: National Marine Fisheries Service
Principal Investigator:	Sam Sharr, Alaska Dept. Fish and Game Jim Seeb, Alaska Dept. Fish and Game Jeep Rice, National Marine Fisheries Service
Project Assistant:	Ron Heintz, National Marine Fisheries Service
Consulting Biometrician:	Brian Bue, Alaska Dept. Fish and Game
Cost of Proposal:	OY 4 $ 253,800 OY 5 $ 543,100 OY 6 $ 318,300 OY 7 $ 185,000
Date Submitted:	June 5, 1992
Inclusive Dates:	July 1, 1992 - July 30, 1995

Principal Investigators:	Samuel Sharr Sam Sharr, ADFG	7/14/92
	Jim Seeb Jim Seeb, ADFG	7/14/92
	Bruce Wright for Jeep Rice, NMFS	7/15/92
Biometrician:	Brian G. Bue Brian G. Bue, ADFG	7/14/92
Program Managers:	Joseph R. Sullivan Joe Sullivan, ADFG	7/14/92
	Bruce Wright Bruce Wright, NMFS	7/15/92
Organization Leader:	Stephen M Fried for KF Ken Florey, ADFG	7/14/92

INTRODUCTION

Field evidence collected during the Natural Resource Damage Assessment (NRDA) of the March 1989 Exxon Valdez oil spill (EVOS) indicates possible genetic damage to pink salmon (*Oncorhynchus gorbuscha*) as a result of exposure to oil during early developmental life-stages. The consequences of this putative damage include physiological dysfunctions which may result in functional sterilization of individuals and substantially reduced reproductive capacity from wild pink salmon populations. If verified in the laboratory, this genetic damage would constitute a major new discovery of an oil pollution effect that has been suspected. An increase in physiological dysfunction above that which would normally occur results in a reduction in production potential. A persistent decline of this nature would render present restoration efforts inadequate as historic spawning escapement levels would be insufficient to sustain a harvestable wild pink salmon population. The purpose of this study is to provide laboratory verification of the field results presented by Sharr et al. (1991) as well as test the hypothesis that exposure of pink salmon to a polluted incubation habitat will result in the functional sterilization of these animals at sexual maturity. This study will collect pink salmon gametes from oiled and non-oiled streams in western Prince William Sound (PWS) and incubate them under controlled conditions to evaluate the effect of physical stream characteristics upon the damages observed in the field. This study will also utilize controlled laboratory exposures to fertilized eggs in a simulated inter-tidal gravel environment in order to mimic actual environmental exposures (link NRDA Study FS2). A third test will expose juvenile pink salmon by feeding them oil contaminated food in order to mimic the environmental exposures of the 1988 brood entering sea water in the spring of 1989 (link NRDA Study FS4).

Pink salmon eggs and fry incubating in the oiled intertidal spawning areas in PWS in 1989, 1990, and 1991 appear to have been adversely affected by EVOS. Oil was deposited in layers of varying thickness in the intertidal portions of streams utilized by spawning pink salmon during the spring of 1989. Pink salmon eggs deposited in 1988 (1988 brood year) emerged as fry through the oiled spawning gravels during the spring of 1989 and began feeding on oiled plankton. These fish showed decreased growth due to oiling (Wertheimer 1991). Although gross oil levels decreased during the summer of 1989, contamination in the intertidal zone was still evident. The pink salmon eggs deposited during the late summer of 1989 (the 1989 brood year) were exposed to intra-gravel contamination from late August 1989 through mid-May 1990. Sharr et al. (1991) detected elevated pink salmon egg mortalities in the intertidal zones of oiled streams while no difference between oiled and non-oiled streams was detected above mean high tide. Elevated egg mortalities in oiled streams were again detected in the 1990 brood year, but only in the highest intertidal spawning zone. Visual observations indicated that the majority of the remaining oil was deposited in this zone. Spawning areas lower in the intertidal zone seemed to be recovering as egg mortalities in these areas were not statistically different from non-oil impacted streams.

Surprisingly, Sharr et al. (1991) found increased egg mortalities in oiled streams during the fall of 1991 survey. Furthermore, significant differences in egg mortality occurred at all tidal zones, including the area above mean high tide. Clearly, the elevated egg mortalities in the oiled streams were not the

direct effect from recent oiling. The 1991 adult returns were the progeny of the 1989 brood year, the group with the highest exposure to intra-gravel oil (the 1989-90 incubation period). We hypothesize that the elevated egg mortalities in 1991 may be the result of genetic damage acquired during development after fertilization in 1989.

This genetic damage hypothesis is consistent with previous laboratory experiments on the effects of crude oil on early life stages of fish and with other NRDA field observations. 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). Mironov (1969) observed reduced survival of fish eggs and larvae exposed to very low aqueous doses (1 ul oil/l seawater) of oil. Moles et al. (1987) confirmed that pink salmon eggs 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 which incubated in oiled areas than in non-oiled areas. It is logical that the same type of damage may have occurred in pink salmon, and this damage could have sterilized a significant proportion of exposed individuals.

Genetic damage will be assessed primarily by flow cytometry, a proven technique for assessing chromosomal aberrations due to environmental genotoxins (McBee and Bickham 1988, Bickham 1990, and Lamb et al. 1991). This method allows for the rapid and possibly more sensitive processing of large numbers of cells per individual and for the timely analysis of many individual samples. The ability to quantify the cellular characteristics for many individuals in a short period of time greatly reduces lab costs over the more traditional cytogenetic analysis while providing equal or greater statistical power for hypothesis testing.

Information gained from this study will provide resource managers insight to the magnitude and persistence of damages sustained by wild pink salmon due to EVOS. Efforts to restore damaged pink salmon populations depend upon the fishery manager's abilities to identify sources of reduced survival and to monitor their persistence. Information on the potential of long term oil exposures to cause genetic damage is needed so spawning escapement goals can be reevaluated and adjusted if necessary. In addition, verification of the genetic hypothesis would provide the first evidence that reproductive capacity of fish exposed to chronic or acute sources of oil pollution would be compromised.

OBJECTIVES

1. Determine whether the increased pink salmon egg mortalities observed in oiled streams by Sharr et al. (1991) can be attributed to the physical characteristics of the study streams.

2. Determine survival, genetic damage, hydrocarbon uptake, mixed function oxidase activity, and sublethal teratogenic effects from long term exposures to oil in each of two exposure groups: 1) green eggs to eyeing and 2) green eggs to swim-up.

3. Determine survival, genetic damage, hydrocarbon uptake, and mixed function oxidase activity from long term exposures of juvenile pink salmon fed oil-contaminated food.

4. Determine growth characteristics from each exposure group from juvenile stage to maturity.

5. Assess whether differences exist among exposure groups with respect to fecundity, fertilization rate, genetic damage, and sub-lethal teratogenic effects in the second generation progeny through swim-up.

6. Compare lab study with field observations:
   1. Determine if the elevated egg mortalities in 1989 and 1990 were potentially caused by oiling in the environment.
   2. Determine if the elevated egg mortalities in oiled streams in 1991 were potentially caused by genetic damage to 1989 eggs.

METHODS

Experimental Design

Four experiments will be undertaken in this study. The first will assess the effects of the physical characteristics of the study streams upon the observed results. This will be accomplished by collecting pink salmon gametes from oiled and non-oiled streams and rearing the resulting embryos in a controlled laboratory environment.

The remaining three experiments will be used to identify population and individual biological effects of oil exposure. The second experiment measures differences in biological response to various concentrations and two durations of oil exposure. It will be a controlled simulation which incorporates our observations of field conditions. This study will span two generations in order to verify the findings of Sharr et al. (1991). The first generation will verify the 1989 and 1990 findings while the second generation will provide evidence to confirm the functional sterility hypothesis. This study will also provide samples of known oiling history for examination of genetic material through the use of flow cytometry.

The third experiment measures the amount of genetic damage sustained by fry feeding on oiled food immediately after emergence. This experiment simulates the experience of fry that emerged just after the spill in 1989. Fry will be fed oiled food for 6 weeks after emergence. While FS4 investigated differences in various biological responses while fish were ingesting oiled food, this experiment continues observation to maturation, and discerns differences in reproductive success between groups fed different concentrations of oil.

The fourth experiment measures differences in survival to emergence between families incubated in a variety of oiled substrates. The existence of significant differences in emergence rates between families under differing conditions would demonstrate that oiling influences the genetic structure of pink salmon populations.

Study 1

The first experiment will provide information to help determine whether the results observed in NRDA Study FS2 can be attributed solely to the physical characteristics of the study streams. In this experiment we will collect gametes from 6 oiled and 6 non-oiled streams from southwestern PWS, make intra- as well as inter-stream crosses, and incubate the resulting embryos in a controlled laboratory environment. Egg mortality will be compared for all crosses. If no difference is observed between the crosses and a significant difference in egg mortality is detected between oiled and non-oiled streams during the fall of 1992 egg digs (Restoration Study R60C), it can be stated that the physical characteristics of the study streams played a role in the results of the previous egg mortality studies.

Gamete collection and fertilization procedures will occur over a three day period to obtain data from 6 oiled and 6 non-oiled streams. Gametes from 30 male and 30 female pink salmon will be collected from 2 oiled and 2 control streams during each sampling day. The gametes will be flown back to the laboratory in Anchorage where all crosses will be made in a timely manner. Stream specific intra-stream embryo pools will be made by randomly combining gametes. The inter-stream embryo pools will be obtained by randomly combining sperm from one stream with eggs from another stream. Reciprocal crosses for the same two streams will also be made. Embryos from both inter-stream crosses will then be combined in equal proportions to form a common inter-stream embryo pool. Nine randomly selected aliquots of approximately 500 embryos each will be collected from each intra-and each inter-stream pool, placed into separate incubating vessels, and randomly placed into a common incubator.

Incubating embryos will be periodically screened for dead eggs and hatching success. Samples of sperm from each male used to build the embryo pools will be cryopreserved for future analysis if required. Embryo samples will also be collected and preserved for future examination by flow cytometry, MFO, and histopathology. The experiment will be terminated prior to swimup at which time all larvae will be killed.

The data will be analyzed as a fixed-effects generalized randomized block design:

$$Y_{ijk} = \mu + B_i + T_j + \epsilon_{ijk} \qquad (1)$$

where Y_{ijk} is egg mortality for sample day i, embryo pool j, and replicate k; μ is the model mean; B_i is sampling day a blocking variable; T_j is the specific intra- or inter-stream embryo pool; and ξ_{ijk} is random error. The relative power of the test was estimated. The sample size was considered sufficient to detect a difference of less than 1.5 standard deviations at α=0.05 and 95% power (Neter et al. 1990). A test with high power is needed to protect against arriving at the conclusion that all observed damages could be attributed to the physical characteristics of the streams when in actuality significant damages due to oil were present.

The assumption of constant error terms will be tested using the F_{max}-test (Sokal and Rohlf, 1969) while normality will be visually assessed using scatter plots, box plots, and normal probability plots (Chambers et. al. 1983). Appropriate transformations will be used to alleviate variance and normality concerns if they are detected. All suitable comparisons will be made using Bonferroni family confidence intervals. The SAS (SAS Institute Inc., 1981) General Linear Models Procedure will be used to analyze the data.

Study 2

The second experiment will examine the effects of six levels of intertidal gravel oil contamination and two durations of exposure on responses to various life history stages. Responses measured in the first generation will include survival to eyeing, survival to emergence, hydrocarbon uptake, survival to maturity, growth to maturity, and fecundity. Responses measured in the second generation will include fertilization rate and number of defective progeny. Samples for use in flow cytometry will be collected from first generation eyed eggs, emergent fry, juveniles (approximately 6 grams in weight), and mature adults. Second generation eyed eggs and emergent fry will be similarly sampled.

Gametes from 48 male and 48 female pink salmon will be collected, randomly mixed into a common embryo pool, and divided into 48 aliquots of approximately 1500 eggs each. The 48 aliquots will then be randomly assigned to one of the 6 oiled gravel treatments (8 aliquots per treatment). Two such groups of 48 aliquots will be created, one for each duration of exposure treatment. The individual aliquots will be incubated in individual pipe incubators filled with oiled gravel. Groups incubated in oiled gravel will be sampled at each major developmental stage; eyeing, hatching and emergence (Table 1). Samples will be randomly removed from the incubators for genetic, mixed-function oxidase (MFO), histopathological, and hydrocarbon analysis. Fry will be counted and inspected upon emergence and then moved to saltwater netpens. Fry from two of the oiling levels will be eliminated at the time of transferring to saltwater pens to reduce the dimension of the study. Water samples collected in conjunction with the embryos will be used to establish oil dosages in each incubator. The median level of gravel contamination by oil will be similar to the levels observed in

PWS streams during the summer of 1989 as determined by NRDA substrate samples.

Intra-group pairings will be made for each of the four remaining first generation treatment groups. Confining the experiment to within group pairings simulates the natural homing characteristics of pink salmon and the relatively low levels of genetic interchange thought to occur between streams in the wild. Second generation pairings will again use a randomly mixed common gamete pool utilizing equal numbers of males and females. These gametes will not be incubated in an oiled environment hence any observed increases in mortalities or defective individuals can be attributed to oiling effects upon the first generation. These eggs will be incubated through hatching. Flow cytometry will be used to examine tissues from eggs and larvae to detect cytogenetic defects. Number of defective progeny will be compared between treatment groups.

The data from each generation will be analyzed as a fixed-effects two-way factorial design with levels of oil concentration and levels of duration of exposure:

$$Y_{ijk} = \mu + C_i + D_j + CD_{ij} + \epsilon_{ijk} \qquad (2)$$

where Y_{ijk} is the response to oiling concentration i and exposure duration j; is the model mean; C_i is the level of oil concentration; D_j is the duration of exposure; CD_{ij} is the interaction term; and ϵ_{ijk} is random error. The power of this test was estimated using data from past pink salmon incubation studies (Wertheimer 1985). These data indicated the ability to detect a difference of less than 10% in survival to emergence at $\alpha = 0.05$, 90% of the time.

Approximately 50-100 samples (individuals, blood, or sperm) will be collected for genetic analysis by flow cytometry at eyeing, hatching, emergent fry, juveniles (roughly 6 gm in weight), and spawning adults from each treatment group in the first generation. Second generation individuals will be similarity sampled at eyeing through emergence. The individual samples will be processed to obtain the mean, variance, and coefficient of variation of genetic material for each individual. The coefficients of variation will be the response variable for analysis by the model presented by equation 1.

The assumption of constant error terms will be tested for all analysis using the F_{max}-test (Sokal and Rohlf, 1969) while normality will be visually assessed using scatter plots, box plots, and normal probability plots (Chambers et. al. 1983). Appropriate transformations will be used to alleviate variance and normality concerns if they are detected. All suitable contrasts will be made using Bonferroni family confidence intervals. The SAS (SAS Institute Inc., 1981) General Linear Models Procedure will be used to analyze the data.

Study 3

The third study will determine if fish fed oiled food for 6 weeks experience genetic damage and reduced gamete viability. Treatments will consist of 6 concentrations of oil in the feed (1 control and 5 different oil levels). Biological responses to be measured between emergence and the first 6 weeks of

feeding will include growth, survival, hydrocarbon concentration, chromosome damage, and MFO incidence. Subsequent response measurements will include growth to maturity, fecundity, fertilization rate and number of defective progeny. Flow cytometry samples taken after the first 6 weeks will mirror those taken in Study 1.

Gametes from 30 male and 30 female pink salmon will be pooled and incubated in Heath incubators. Upon emergence, 5 aliquots of approximately 1200 fry will be assigned to each treatment. A treatment consists of feeding food oiled at one of 6 concentrations. Fry will be fed oiled food for 6 weeks. Oil levels in the food will repeat the exposures applied under FS4. Each group will be cultured separately until they are large enough to PIT tag. PIT tagged individuals will be placed into nets with individuals from Study 1 and reared to maturity. From tagging to the end of the study, these fish will be treated and sampled the same as those in Study 1.

A fixed effects one way analysis of variance will be used to analyze data from this experiment. The model is;

$$Y_{ij} = \mu + C_i + e_{ijk} \qquad (3)$$

where Y_{ij} is the response to oiling concentration i; is the model mean; C_i is the level of oil concentration; and e_{ij} is random error. The power of this experiment was established using unpublished pink salmon growth data from LPW. Calculations indicate the ability to detect a difference of 10% in growth to PIT tagging at $\alpha = 0.05$, 80% of the time.

Study 4

The fourth study will determine if there is evidence of differential gamete survival to emergence between ten randomly paired families for five different treatment regimes. The treatments will be a combination of oiling concentrations from study 1 (Ci) and duration of exposure as follows: 1) control, 2) C_2 through eyeing, 3) C_2 through emergence, 4) C_4 through eyeing, and 5) C_4 through emergence. The fertilized gametes from a randomly selected pair of pink salmon (family) will be divided into 15 aliquots of approximately 100 eggs each. The aliquots will then be randomly assigned one of the five treatments (3 aliquots per treatment). Ten family groups will be created and assigned in this manner. The individual aliquots will be incubated in pipe incubators. All fish culture practices such as location on water distribution lines will be randomized between families. Families will be incubated until emergence when they will be inspected, counted, and terminated.

A mixed-effects model will be used to test for differences in survival between families for the five treatments:

$$Y_{ijk} = \mu + F_i + T_j + e_{ijk} \quad (4)$$

where Y_{ijk} is the survival of aliquot k for family i and treatment j; is the overall mean; F_i is the family effect; T_j is the oil concentration and duration combination; and $e_{jk(i)}$ is the random error. The power of this test was again estimated using data from past pink salmon incubation studies (Wertheimer 1985). These data indicated the ability to detect a difference of less than 10% in survival to emergence at $\alpha = 0.05$, 80% of the time.

The assumptions of constant error terms and normality will be tested using the methods utilized in study 1. All appropriate contrasts will be made using Bonferroni family confidence intervals. The SAS (SAS Institute Inc., 1991) General Linear Models Procedure will be used to analyze the data.

Flow Cytometry

We will use flow cytometry (e.g., Kocan and Powell 1985, McBee and Bickham 1988) to analyze the DNA content of sperm, red blood cells, and other somatic tissues as called for at the appropriate test points in experiments 1-3. A few drops of sperm will be collected in 0.5 ml 5.4 % glucose, and a few drops of blood will be collected in 0.5ml anticoagulant (2% glucose, 0.8% trisodium citrate, 0.4% sodium chloride); both will be cryprotected with 9.0% dimethyl sulfoxide and shipped on dry ice to the Anchorage lab for storage at -80° C until analysis. Other somatic tissues will be collected on HEPES (N-2-hydroxyethylpiperazine-N'-2-ethanesulfonic acid), shipped on ice, and stored at 4° C until analysis the following day.

Suspensions of stained nuclei will be produced for DNA content analysis. Sperm and blood cell samples will be processed the same way. After thawing, five ul of the cell suspension will be added to 1 ml of a solution of 10 ug/ml diamidino-2-phenylindole (DAPI, a DNA-specific fluorescent dye) in a buffer containing 0.1 M Tris (pH 7.4), 0.146 M NaCl, 1.0 mM CaCl2, 21.0 mM MgCl2, and 0.6% Noniodet P-40 (e.g., Seeb et al 1988). For other somatic tissues, 5 mg will be minced with a scalpel and added directly to the DAPI. The P-40 scrubs cell membranes, and the resulting nuclear suspensions will be filtered through a 37 um filter to remove clumps and cellular debris. DNA content histograms for all tissues will then be obtained using a Partec PAS II flow cytometer following the methods of Lamb et al. (1991).

Fish Culture

This section describes the generation of the random embryo pool as well as fish culture methodologies.

Random Gamete Pools

The randomized embryo pool used in studies 1 and 2 will be created by 1) spawning the females into a common container, 2) randomizing the eggs within the container, 3) dividing the eggs into aliquots, 4) fertilizing each aliquot with an individual male, and 5) again recombining all fertilized aliquots into a composite embryo pool. The aliquots used in the experiment will then be randomly drawn from the composite embryo pool.

Fish Culture for Study 1

Embryos for Study 1 will be incubated in Heath incubators located in the Alaska Department of Fish and Game histopathology laboratory in Anchorage, Alaska. Each incubator tray will have an independent water supply from a common water source.

Fish Culture For Studies 2 Through 4

The National Marine Fisheries Research Station at Little Port Walter (LPW), in southeastern Alaska, will be used for the remaining incubation experiments (studies 2-4). All pink salmon gametes will be collected at the Sashin Creek weir located near the facility.

Pipe incubators will be used to simulate in stream incubation. These incubators will be constructed from 30 cm sections of 16 cm polyvinylchloride pipe. The pipe will be stood on end, sealed, and fitted with a water intake at the bottom. The pipe will then be filled with appropriately treated gravel. This design allows water to upwell through the gravel and out an outlet fitting at the top of the incubation pipe.

Fertilized eggs will be laid on top of the gravel to incubate. Upon hatching, the alevins will be permitted to burrow into the substrate. Eggs will be exposed to saltwater for 4 hour intervals every 12 hours during incubation to simulate intertidal incubation. Emerging fry will be removed to saltwater netpens.

All fry will be raised to maturity using standard hatchery procedures. They will be fed a commercial diet, vaccinated against *Vibrio anguillarum*, and treated with antibiotics as needed. Maturing fish will be fed a commercially available brood diet.

The remaining treatment groups in study 2 (2 oil concentration levels will be eliminated at emergence) will be reared in separate netpens until they are 6 g at which time they will be tagged with passively induced transponders (PIT tags). PIT tags provide individual fish with unique identification codes which can be interrogated without harming the fish. Approximately 300 fish from each treatment group will be tagged. Each set of tagged fish will be split into two equal size groups and placed into one of two netpens. Each netpen will contain fish from all treatment groups. One netpen will be kept at LPW while the other

will be maintained 5 km to the north at Osprey Bay to ensure survival of the experiment. Fish will be counted and measured for length and weight each fall and spring to establish survival and growth rates during the experiment.

Development of Dose Response Curves

Dosing levels in Studies 2,3, and 4 will be established by analyzing hydrocarbon concentrations in incubator effluent and food with gas chromatograph and mass spectroscopy (GC/MS) at each major developmental stage. Effluent samples for the GC/MS will be collected and pooled from each of the pipe incubators in an oiling concentration-duration of exposure treatment. It will not always be necessary to sample all of the treatment cells in the experimental design as the number of uniquely exposed treatment groups changes with embryo development (Table 1). For example, at eyeing there are 6 uniquely exposed groups since all exposures have been made for the same amount of time at 6 different oil concentrations; however, at emergence there are 11 uniquely exposed treatment groups, different concentrations have been applied over 2 different durations. Additional effluent samples will be collected at each major developmental stage for spectrophotofluoremetry, to provide estimates of variability between incubators within a treatment cell. Oil concentrations in incubator gravel will be obtained from spectrophotofluoremetry and related to levels observed in streams sampled under NRDA. Each treatment cell with a unique exposure level will be sampled at least 3 times for tissue hydrocarbon concentration. Samples will be collected at all stages from eyeing to 6 weeks after emergence

DELIVERABLES

Interim report 1 August 1993:

The first interim report will include the following information:

Effect of physical stream characteristics upon the egg mortalities observed in the field.

Effect of known crude oil doses on pink salmon egg survival to emergence, cellular DNA content, hydrocarbon uptake, and initiation of MFO.

Effect of family on egg survival to emergence under various oil dosing regimes.

Effect of food contaminated with known oil concentrations on pink salmon growth and survival the first 6 weeks after emergence.

A summary will be submitted for submission to a refereed journal.

Interim report 2 August 1994:

Update of interim report number 1 including growth data from emergence to age 1+.

Final report July 1995:

The final report will present the following information.

Effect of physical stream characteristics upon the egg mortalities observed in the field.

Effect of known crude oil doses on pink salmon growth and survival to maturity.

Effect of known crude oil doses on pink salmon gamete viability.

Reconcile laboratory results with field observations from PWS pink salmon streams in 1989-1992. Could oil have caused genetic damage with resultant lowered gamete viability in wild stocks?

SCHEDULES AND PLANNING

DATES	ACTIVITY
Jul-Dec 1992	Hire technician, set up experimental apparatus, spawn fish, conduct intra-gravel oil exposures, collect samples
Jan-Jun 1993	Conduct oiled food exposures, collect samples Hydrocarbon analyses
Jul-Dec 1993	Analyze of preliminary data, PIT tag fish. Monitor growth/survival
SEPT 1993	Interim report on first generation survivals, effects
Jan-Jun 1994	Monitor growth/survival
Jul-Dec 1994	Collect maturation data, Spawn first generation, incubate second generation, terminate second generation observations
SEPT 1994	Interim report: update on first generation effects
Jan-Jun 1995	Complete data analyses, draft reports
JULY 1995	Final report

MANAGEMENT PLAN

This will be a joint project between ADFG and NMFS. ADFG will be the lead agency for overall program management, genetic damage determinations, MFO analysis, and histopathological work. ADF&G will be responsible for the gamete collection and fish culture in Study 1. NMFS will be responsible for the oil exposures, chemistries, fish culture, and hydrocarbon end points in Studies 2 through 4. Both agencies will have statistical analyses responsibilities, particularly with the experimental designs. Both agencies will have joint responsibilities with meshing the lab results with field results to reach a conclusion in the study.

For ADF&G, principal investigator Sharr (Fisheries Biologist III) will provide field results to date, help design the laboratory experiment, and insure that laboratory conditions and treatments simulate those observed in wild streams. Principal investigator Seeb (Principal Geneticist) will help design and provide genetics oversight for the laboratory rearing of wild embryos as well as the flow cytometry portions of the experiment. He will also supervise the collection and analysis of flow cytometry samples. Consulting biometrician Bue (Biometrician II) will conduct the experimental design and provide statistical oversight for the project. Sharr, Seeb, and Bue will cooperate in the data analysis and writing of project reports.

For NMFS, overall supervision of this project will rest with NMFS GS-14 physiologist, principal investigator (Rice). The PI will supervise two primary task leaders: a GS-11 biologist (Heintz) assigned to LPW, and a GS-13 chemist (Short) responsible for dosing and chemistries. Field sample and data collection will be supervised by the GS-11 biologist. A GS-9 biologist will assist the GS-11 biologist in setting up the experiment, and collecting data. Technicians will be required to perform detailed fish culture such as incubator maintenance, and fish feeding.

Sample and Data Recording, Processing and Archival

Data will be recorded in an Rbase database. There will be several data tables in the database, including "incubation", "rearing" and "spawning". The incubation table will include incubator number, number eggs seeded into incubator, and for each developmental stage: water chemistry, hydrocarbon concentrations, MFO presence, coefficient of variation for cellular DNA content, and number surviving to emergence. The key field that links the "rearing" table with the "incubation" table will be incubator number. The "rearing" table will also include PIT tag code, length and weight at each sample point. The "spawning" table will include the first generation incubator number, second generation incubator number, second generation fertilization rate, first generation fecundity, survival to eyeing, hatching, and emergence.

Graphical summaries of data will be made using LOTUS 123, and statistical analysis will use SAS and MINITAB. All raw and summarized data and reports are stored as hard copy and electronically on diskettes in two separate locations at the NMFS Auke Bay Lab.

Biological samples for hydrocarbon, MFO, and DNA analyses will be clearly labelled both on the inside and outside of the container with indelible ink. Samples will be stored in freezers at the NMFS Auke Bay Lab.

LOGISTICS

Wild gametes from the wild oiled and non-oiled streams will be collected in the field and transported to Anchorage by chartered aircraft.

Gametes for dose response studies will be collected from the pink salmon population resident at the LPW hatchery. Gravel for incubators, incubators, and fish food will be transported to LPW by the NOAA vessel John N. Cobb. Field crews and samples will be transported to and from LPW by air charter.

BUDGET

	Year 1 7/92-3/93		Year 2 3/93-10/93		Year 3 10/93-10/94		Year 4 10/94-10/95	
	NMFS	ADFG	NMFS	ADFG	NMFS	ADFG	NMFS	ADFG
SALARIES								
ADFG								
1 FB III Biologist - PI	-	-	-	-	-	-	-	-
1 Statewide Geneticist - PI	-	-	-	-	-	-	-	-
1 Senior Fish Culturist	-	-	-	-	-	-	-	-
1 Biometrician II	-	18.0	-	12.0	-	12.0	-	12.0
1 FB II Flowcyto Post Doc	-	25.6	-	31.0	-	53.0	-	25.6
.5 Technician II + OT	-	38.9	-	31.9	-	7.0	-	-
.5 FB II	-	21.1	-	12.6	-	16.9	-	-
NMFS								
1 GS 14 Biologist - PI	-	-	-	-	-	-	-	-
1 GS 12 Biologist	-	-	-	-	-	-	-	-
1 GS 11 Biologist - PI	-	-	49.3	-	61.5	-	30.7	-
.5 GS 9 Biologist	-	-	19.8	-	27.7	-	27.7	-
1 GS 7 Technician	15.7	-	28.8	-	39.7	-	-	-
1 GS 7 Technician (logistics)	13.5	-	22.2	-	27.0	-	13.5	-
1 GS 7 Technician (Biometrics support)	-	-	-	-	-	-	13.5	-
GS 13 Chemist	-	-	-	-	-	-	10.0	-
TRANSPORTATION								
Beaver flights to LPW	4.0	12.0	12.0	12.0	8.0	0.0	4.0	0.0
Meetings	4.0	7.0	8.0	10.0	4.0	4.0	4.0	4.0
EQUIPMENT								
flow cytometer	-	55.0	-	-	-	-	-	-
lab supplies (flowcyto)	-	-	-	15.0	-	15.0	-	7.0
nets/saltwater system/ building supplies	14.0	5.0	19.0	2.0	4.0	-	-	-
field supplies	-	5.0	-	2.0	-	-	-	-
vaccine	-	-	1.0	-	-	-	-	-
antibiotics	-	-	1.0	-	4.0	-	-	-
PIT Tags	-	-	17.0	-	-	-	-	-
beach seines	-	2.0	-	-	-	-	-	-
COMMODITIES								
Fish food	-	-	35.0	-	15.0	-	-	-
CONTRACTS								
Hatchery space rental	-	3.5	-	3.5	-	-	-	-
Flowcytometer Maint.	-	-	-	5.0	-	5.0	-	5.0
MFO analysis	-	-	-	58.0	-	-	-	-
Histopathology	-	-	-	16.0	-	-	-	5.0
Spectrophotofluoremetry	-	-	15.0	-	-	-	-	-
Hydrocarbon analysis	-	-	75.0	-	-	-	-	-
Install saltwater system	3.0	-	-	-	-	-	-	-
CONTINGENCY	-	6.5	19.0	10.0	9.5	5.0	4.0	4.0
AGENCY TOTAL	54.2	199.6	322.1	221.0	200.4	117.9	107.4	77.6
TOTAL ANNUAL COST	253.8		543.1		318.3		185.0	

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TABLE I. Summary of sample sizes and costs broken down by developmental stage.

		number of samples	cost	total cost	Description
EYEING					
water	gcms	11	400	4400	11 treatment groups
water	flouresnc	88	70	6160	88 incubators
Tissue	gcms	18	600	10800	triplicates of 6 unique expsrs
tissue	mfo	40	100	4000	8 samples of 6 unique expsrs
			SUBTOT	25360	
HATCHING					
water	gcms	11	400	4400	11 treatment groups
water	fluoresnc	88	70	6160	88 incubators
Tissue	gcms	18	600	10800	triplicates of 6 midpoints of expsrs
tissue	mfo	88	100	8800	8 samples of 11 unique expsrs
			SUBTOT	30160	
EMERGENCE					
water	gcms	11	400	4400	11 treatment groups
water	fluorsnc	88	70	6160	88 incubators
Tissue	gcms	33	600	19800	triplicates of 11 unique expsrs
tissue	mfo	88	100	8800	8 samples of 11 unique expsrs
			SUBTOT	39160	
FED FRY					
food	gcms	18	600	10800	triplicates of 6 concentrations
Tissue	gcms	18	600	10800	triplicates of 6 treatmnts
tissue	mfo	96	100	9600	12 samples of 6 treatments
			SUBTOT	31200	
OTHER					
Inc gravel	fluorsnc		88	6160	88 incubators
creek gravel	fluorsnc			70	
			SUBTOT	6160	
			GRANDTOT	132040	