Status Report: 1994 Exxon Valdez Oil Spill Restoration Projects

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(for the period October 1, 1993 - September 30, 1994)

<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEPA Spent Req'd.*		<u>Comments</u>
Adminis	tration		\$4,200.0			
	Administration		\$4,200.0	Ŋ		
General	Restoration		\$5,415.0			
94007	Site Specific Archaeological Restoration	ADNR ·	\$ 599.5	Y	EA Completed	Combined with Project 94386 (Artifact Repositories - Planning and Design) to develop cost-effective plan for protection of injured resources on public lands while involving local communities in determination of appropriate strategy. Explore use of private organizations to implement.
94041	Introduced Predator Removal from Islands	DOI	\$84.0	r., Y	EA Completed	Reduction to two islands.

^{*} Y=EA or EIS required; N=project qualifies for categorical exclusion.

<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted		NEPA Reg'd.*	NEPA Status	Comments
94043	Cutthroat and Dolly Habitat Restoration In Prince William Sound	USFS	\$3.5		Y	EA In Preparation	NEPA compliance only. No implementation prior to full NEPA compliance. Combine with 94139 (Salmon Instream Habitat and Stock Restoration) and eliminate overlapping costs.
94090	Mussel Bed Restoration and Monitoring	NOAA	\$681.1		Y	EA In Preparation	No implementation prior to full NEPA compliance. Coordinate with Project 94266 (Shoreline Assessment) for additional cost savings.
94137	Stock Identification of Chum, Sockeye, Chinook, and Coho Salmon in Prince WIlliam Sound	ADFG	\$261.6		N		Approved as final expenditure to recoup previous Trustee Council investment in this project. Will only identify chum and sockeye.
94139	Salmon Instream Habitat and Stock Restoration	USFS	\$761.3	÷	Y	EA In Preparation	No implementation prior to full NEPA compliance. Combine with Project 94043 (Cutthroat and Dolly Restoration) and approve with two years funding. Subject to NEPA compliance (EAs) and review of benefit:cost raio.

^{*} Y=EA or EIS required; N=project qualifies for categorical exclusion.



<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEPA Spent Req'd.*	NEPA Status	Comments
94166	Herring Spawn Deposition and Reproductive Impairment	ADFG	\$466.3	N		
94184	Coded Wire Tag Recoveries from Pinks in Prince William Sound	ADFG	\$47.8	N		Integrate with 94320 (PWS System Investigation).
94185	Coded Wire Tagging of Wild Pinks for Stock Identification	ADFG	\$34.8	И		Funding is for completion of the 1993 report. Additional funding will be integrated with 94320 (PWS System Investigation).
94217	Prince William Sound Area Recreation Implementation	USFS	\$76.3	N		Funding is for completion of the 1993 report.
94244	Harbor Seal and Sea Otter Co-op Subsistence Harvest Assistance	ADFG	\$54.5	N		Recommend that Council staff work with DCRA and subsistence users to examine opportunities to fund community-based implementation of this project with criminal funds.
94255	Kenai River Sockeye Salmon Restoration	ADFG	\$406.1	N		

^{*} Y=EA or EIS required; N=project qualifies for categorical exclusion.



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<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount Spent	NEPA Req'd.*	NEPA Status	Comments
94259	Coghill Lake Sockeye Salmon Restoration	ADFG	\$324.1		Y	EA Completed	Coordinate with Project 94320 (PWS System Investigation) to obtain project smolts.
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94266	Shoreline Assessment and Oil Removal	ADEC	\$403.1		Y	EA In Preparation	No implementation prior to full NEPA compliance. Project is limited to beach rehabilitation in PWS and site assessment on Alaska Peninsula. Coordinate with Project 94090 (Oiled Mussel Bed
). 5. 2	,					Restoration) for additional cost savings.
94272	Chenega Chinook Release Program	ADFG	\$57.4		Y	EA Completed	Recommend that Council staff work with DCRA and subsistence users to examine opportunities to fund community-based implementation of this project with criminal funds.
94279	Subsistence Food Safety A Testing	ADFG	\$379.2		N		Recommend that Council staff work with DCRA and subsistence users to examine opportunities to fund community-based implementation of this project with criminal funds.

^{*} Y=EA or EIS required; N=project qualifies for categorical exclusion.

<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEI Spent Reg'c		Comments
94417	Waste Oil Disposal Facilities	ADEC	\$232.2	Y	EA In Preparation	No implementation prior to full NEPA compliance. Approved with understanding that future operating and maintenance cost will be assumed by communities and a full report on the project results will be given to the Trustee Council before further funding.
94423	Oil Spill Public Information Center (OSPIC)		\$2 80.0	N		
94504	Genetic Stock Identification of Kenai River Sockeye	ADFG	\$262.2	И		Closeout of a 1993 project.
Habitat I	Protection		\$2,245.1			
94110	Habitat Protection - Data Acquisition and Support	ADNR	\$678.7	N		Approved in conjunction with development of a comprehensive habitat protection plan that covers the spill area and is linked to protection of key injured resources.

^{*} Y=EA or EIS required; N=project qualifies for categorical exclusion.

<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEPA Spent Req'd.*	NEPA Status	Comments
94126	Habitat Protection and Acquisition Fund	ADNR	\$1,160.3 	N		Approved in conjunction with development of a comprehensive habitat protection strategy covering the spill area, linked to protection of injured resources. Negotiation process, final fund allocation to be worked out by Executive Director.
94505	Information Needs for Habitat Protection	USFS	\$406.1	N		Closeout of a 1993 project.
Monitor	ing and Research		\$12,076.4			
94020	Black Oystercatcher Interaction with Intertidal	DOI	\$17.3	N		Funding is for completion of 1993 report. The need for additional funding will be reviewed as part of 1995 Work Plan.
94039	Common Murre Population Monitoring	DOI	\$227.2	N		Evaluate further study needs in 3 - 5 years.
94064	Harbor Seal Habitat Use and Monitoring	ADFG	\$270.2	N		

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<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEPA Spent Req'd.*	NEPA Status	Comments
94066	Harlequin Duck Recovery Monitoring	ADFG	\$139.3	N		Deferred funding pending completion of 1993 report and synthesis of available information. Review as part of the 1995 Work Plan. Strongly urge federal and state agencies consider further restriction on sport hunting.
94086	Herring Bay Experimental and Monitoring Studies	ADFG	\$729.4	N		Approved contingent upon a revised scope of work and budget focused on intertidal resources.
94092	Killer Whale Recovery Monitoring	NOAA	\$33.7	N		Funding is for completion of the 1993 report. Addition funding will be deferred until 1995.
94102	Marbled Murrelet Prey and Foraging Habitat in Prince William Sound	DOI	\$231.5	N		Approved contingent on integration with Projects 94163 (Forage Fish) and 94173 (Pigeon Guillemot) and elimination of overlapping costs.
94159	Marine Bird & Sea Otter Boat Surveys	DOI	\$107.0	N		Spring survey approved. Disapproved summer surveys pending review of survey frequency needs.

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<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEPA Spent Req'd.*	NEPA Status	Comments
94163	Forage Fish Influence on Recovery of Injured Species	NOAA	\$606.6	N		Integrate with Projects 94320 (PWS System Investigation), 94102 (Murrelet Prey), and 94173 (Pigeon Guillemot).
94165	Herring Genetic Stock Identification in Prince William Sound	ADFG	\$62.2	N		Approved contingent upon Chief Scientist/peer review acceptance of damage assessment studies.
94173	Pigeon Guillemot Recovery Monitoring	DOI	\$201.1	N		Approved contingent on reduction in scope and integration with Projects 94163 (Forage Fish) and 94102 (Murrelet Prey) and elimination of overlapping costs.
94191	Oil Related Egg and Alevin Mortalities	ADFG	\$782.9	N		
94199	Institute of Marine Science - Seward Improvements	ADFG	\$50.0	Y	EA In Preparation	Approved up to \$50.0 for initial work, including NEPA compliance. Project funding level recommendation to be developed by Executive Director for further consideration by Trustee Council. Estimated cost of project is \$24,984.0.

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<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEPA Spent Req'd.*	NEPA Status	Comments
94246	Sea Otter Recovery Monitoring	DOI	\$207.4	Ŋ		Funding is for completion of the 1993 report. Deferred additional funding pending synthesis of existing data. Review for consideration as part of 1995 Work Plan. Disparity in boat and aerial survey results needs to be resolved.
94258	Sockeye Salmon Overescapement	ADFG	\$854.9	N		
94285	Subtidal Sediment Recovery Monitoring	NOAA	\$629.2	И		Approved contingent upon Chief Scientist/peer review approval of reports from prior years.
94290	Hydrocarbon Data Analysis and Interpretation	NOAA	\$130.2	N		
94320	PWS System Investigation	ADFG	\$6,350.0	Y	EA Completed	Approved conditionally (see Trustee Council minutes) and subject to successful integration of this project with Projects 94163, 94184, 94185, 94187, 94192, 94259, and those portions of Project 94421 that involve research. Consists of 19 related projects.

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<u>No.</u>	<u>Title</u>	Agency	Amount Budgeted	Amount NEPA Spent Req'd.* NEPA Status	Comments
94422	Environmental Impact Statement for the Restoration Plan	USFS	\$343.4	N	Total project cost for FFY 94 and FFY 95 is \$343.4. FFY 94 cost is \$323.5.
94425	Marine Mammal Book	NOAA	\$20.0	N	Will make publication more widely available to the public.
94506	Pigeon Guillemot Recovery	DOI	\$13.9	N	Closeout of a 1993 project.
94507	Symposium Proceedings Publication	NOAA	\$69.0	N	
	%.				
Restorat	ion Reserve		\$12,000.0		
94424	Restoration Reserve	DOL	\$12,000.0	N	Will provide funding needed to undertake long-term restoration activities.

\$35,936.5

1994 Total

^{*} Y=EA or EIS required; N=project qualifies for categorical exclusion.

Status Report: 1993 Exxon Valdez Oil Spill Restoration Projects

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(for the 7 month period March 1, 1993 - September 30, 1993)

<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
Admin	nistration		\$4,135.8	\$2,792.3		
93AD	Administrative Director's Office		\$1,702.2	\$1,268.9	Ongoing.	Not applicable.
93FC	Financial Committee		\$105.2	\$52.6	Ongoing.	Not applicable.
93RT	Restoration Team Support		\$2,328.4	\$1,470.8	Ongoing.	Not applicable.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
Damag	ge Assessment		\$782.1	\$699.2		·
93002	Sockeye Salmon Overescapement	ADFG	\$714.6	\$637.1	1993 field data collection completed. Laboratory analysis approximately 50% completed. Final 1993 progress report will be submitted in March 1994.	1993 Kenai smolt demonstrated continued high overwintering mortality with less than 500,000 smolt estimated to migrate, while Tustumena Lake produced approximately 9 million smolt. Red and Akalura lakes demonstrated poor smolt production on Kodiak Island. Fall 1992 Tustumena and Skilak Lake dry fat content support poor nutrition going into winter as probable cause of mortality in Skilak Lake. Adult 1992 returns to the Kenai River were consistent with smolt estimates. However, primary age class of the 1989 brood year will return in 1994 and will determine accuracy of smolt estimates. (Recent
93057	Damage Assessment GIS	ADNR	\$67.5	\$62,1	Completed. No report necessary.	Provided mapping and database support for damage assessment studies. Cataloged and plotted over 160 maps for public access at OSPIC.

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<u>No.</u>	Title	Agencies	Budgeted*	Spent*	<u>Status</u>	Results and References
Gener	al Restoration		\$3,927.7	\$1,706.8		
93006	Site Specific Archaeological Restoration	DOI ADNR USFS	\$260.1	\$100.9	Fieldwork is complete. Report is under preparation and expected to be submitted 1/15/94.	Not available.
93015	Kenai River Sockeye Salmon Restoration	ADFG	\$512.6	\$402. 3	Draft report due 3/31/94.	Successful collection of baseline and fishery genetic samples. Successful inseason hydroacoustic survey of Upper Cook Inlet by subcontractor.
93016	Chenega Bay Chinook and Silver Salmon (NEPA Compliance)	ADFG	\$10.7	\$10.7	Final document due to lead federal agency (NOAA) on 1/14/94.	Not applicable.
93017	Subsistence Food Safety Survey and Testing	ADFG NOAA	\$307.1	\$243.2	Analysis of samples collected is ongoing.	First round of tests for hydrocarbon contamination of subsistence resources showed little or no contamination. Results of second round of testing are pending. The observations of abnormalities in the tested resources caused a shift in concerns of subsistence users from oil contamination to what effects these abnormalities have on these resources.
93024	Restoration of Coghill Lake Sockeye Salmon Stock	ADFG USFS	\$191.9	\$143.1	Lake fertilization completed for 1993 season. Lake morphology completed.	Monitoring showed the need for modifying both the type and concentrations of fertilizer.

Amount

Amount

Status Report: 1993 Projects - 4/20/94

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<u>No.</u>	Title	Agencies	Budgeted*	Spent*	<u>Status</u>	Results and References
93032	Cold Creek Pink Salmon Restoration (NEPA Compliance)	ADFG	\$5.0	\$0.0	Final report accepted.	Cost:benefit analysis showed project to be marginal.
93038	Shoreline Assessment	ADEC ADNR ADFG NOAA USFS DOI	\$539.2	\$353.0	Report being drafted. Results presented to the Trustee Council 11/30/93.	Surface oil has become stable. Subsurface oil has decreased substantially since 1991. Oiling is discontinued throughout the study site.
93062	Restoration GIS	ADNR	\$123.3	\$122.1	Completed. No report necessary.	Provided technical mapping and database support for restoration projects. Generated spill area map and land status maps for Kachemak Bay, Seal Bay, and Eyak lands.
93063	Anadromous Stream Surveys	ADFG USFS	\$59.4	\$59.0	Report for R105 is being revised.	This project was funded only for retrieving stream thermometers and completion of report for R105, not for field work. See R105 status report.
93065	Prince William Sound Recreation	ADNR USFS	\$72.0	\$40.8	Continued as 94217. Analysis of findings and final report being drafted.	Recreation Injury Statement (10/93) was incorporated into the Draft Restoration Plan. Recreation restoration projects for Prince William Sound were prioritized through a public consensus process; high priority projects were included in the Draft 1994 Work Plan.
93066	Alutiiq Archeological Repository	ADEC	\$1,500.0	\$0.0	About to issue grant to Kodiak Area.Native Association for construction of the facility.	Facility expected to open in early 1995.

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No.	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
93067	Pink Salmon Coded Wire Tag Recovery	ADFG	\$220.0	\$147.1	Report being reviewed.	Reduced commercial exploitation of damaged wild pink salmon populations through timely inseason estimates of hatchery and wild contributions to harvest. Accurate and timely stock composition estimates were used by fisheries managers to justify restriction of fishing fleet to areas where interception of damaged wild populations in mixed-stock fisheries could be minimized.
93068	Non-Pink Salmon Coded Wire Tag Recovery	ADFG	\$126.4	\$84.6	Report being drafted.	Timely and accurate inseason estimates of hatchery and wild stock contributions to commercial harvest for improved management of wild stocks in mixed-stock fisheries.

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			Amount	Amount		DIVII
<u>No.</u>	<u>Title</u>	Agencies	Budgeted*	Spent*	<u>Status</u>	Results and References
Habit	at Protection	\$	39,732.2	\$8,826.2		
93033	Harlequin Duck Restoration	ADFG	\$300.0	\$193.0	Draft final report in preparation. Completed habitat evaluation assistance.	Only 3 harlequin broods observed in western Prince William Sound; 14 in eastern Prince William Sound. Decreased numbers of harlequins molting in western Prince William Sound in July. Suspect incomplete gonadal development in prenesting western Prince William Sound harlequins. Blood/physiological analysis and hydrocarbon analyses in process. Harlequin breeding stream/nest site model in preparation. Harlequin breeding assessment completed on North Afognak Island.
93034	Pigeon Guillemot Recovery	DOI	\$165.8	\$134.4	Draft report in review.	One hundred eighty-four colonies, concentrated in southwest Prince William Sound and in the Naked Islands were identified. Guillemots continue to decline in Prince William Sound from a high of 15,000 in 1970 to a present population of 3,000 - 4,900.
93035	Black Oystercatchers / Oiled Mussel Beds	DOI	\$107.9	\$ 51.0	Draft report in revision prior to submission to Chief Scientist.	Growth rates of oystercatcher chicks were lower on oiled than unoiled nest sites. Some alphatic compounds were detected in 1992 fecal samples from oiled sites. Breeding pairs increased on oiled Green Island from 1992 to 1993 but decreased on Knight Island from 1991 to 1993.

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<u>No.</u>	Title	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
93051	Stream Habitat Assessment and Habitat Information for Murrelets	ADFG USFS DOI	\$1,222.3	\$790.3	This is the second and final year of the project. It is a continuation of R47. Draft report on habitat information for murrelets is in internal Fish and Wildlife Service review. First draft report on stream habitat assessment is being revised.	Late season surveys, sites at the heads of bays, low elevations, high percentages of forest cover, and large trees were all consistent predictors of high murrelet activity. Radar performed better than humans in detecting murrelets and was cheaper than boat-based or ground-based surveys by humans. About 995 km of shoreline and 117 km² of uplands were surveyed for anadromous fish streams on private lands on the lower Kenai Peninsula and in Prince William Sound, resulting in discovery of 186 anadromous streams totaling about 57 km. Stream habitat parameters were collected along all
93059	Habitat Identification Workshop	USFS	\$42.3	\$23.1	Final report accepted.	Identified parcels of nonpublic land containing critical habitat necessary for the recovery of injured resources and services.
93060	Accelerated Data Acquisition	USFS	\$43.9	\$43.9	Project completed. Data collected.	Collected and organized existing resource data needed for the analysis of private lands in the oil spill area.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	Status
93064	Imminent Threat Habitat Protection	ADNR ADEC USFS	\$37,850.0	\$7,590.5	Completed. The Comprehensive Habitat Protection process was reviewed at a workshop; recommendations were incorporated into the process.

Results and References

Imminent Threat Evaluation and the first round of Large Parcel Evaluation were completed. \$7.5 million from settlement funds were combined with \$14.5 million from other sources for the purchase of private inholdings in Kachemak Bay. \$29,950,000 was committed from the most recent court request for the initial payment for purchase of private land near Seal Bay on Afognak Island. The total purchase price of this transaction is \$38,700,000 with the balance to be paid in three annual installments. References: "Opportunities for Habitat Protection/Acquisition" (2/16/93) and "Comprehensive Habitat

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<u>No.</u>	Title	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
Monit	oring and Research		4,335.2	\$3,666.5		
93003	Salmon Egg to Pre-emergent Fry Survival	ADFG NOAA	\$686.0	\$686.2	Report being revised. Continuation of R60C. Expected to continue into 1994 and 1995.	Oil exposures completed for 1992 and 1993 brood years. Spawning of surviving adults is scheduled for September 1994 with possible long-term damage to genetics and survival of progeny to be determined in early 1995. Persistence of elevated embryo mortalities in oiled streams in 1992 indicate possible genetic damage to wild pink salmon populations from the Exxon Valdez oil spill. Preliminary laboratory studies support the genetic hypothesis. Additional laboratory studies demonstrate dose response of pink salmon embryos when incubated in gravel exposed to crude oil from the Exxon Valdez.
93012	Genetic Stock Identification of Kenai River Sockeye Salmon	ADFG	\$300.6	\$292.6	Report being drafted.	Genetic data were collected during 1992 and 1993 from spawning populations contributing to mixed-stock harvest of sockeye salmon in Cook Inlet. These data were used in a pilot study to estimate the component of Kenai River stocks harvested in mixed-stock areas of Upper Cook Inlet.
93022	Monitor Murre Colony Recovery	DOI	\$177.2	\$135.7	Project report in preparation.	Murre productivity in the Barren Islands was 0.4 - 0.6 chicks per nest site in 1993, up from near zero in 1989. Population counts on plots were similar to or higher than in previous postspill years.

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			Amount	Amount		DIVII
<u>No.</u>	<u>Title</u>	Agencies	Budgeted*	Spent*	Status	Results and References
93036	Oiled Mussel Beds	DOI NOAA	\$404.8	\$389.1	Report in preparation. Continuation of R103.	Identified 27 mussel beds with total petroleum hydrocarbons greater than 10,000 mg/g wet weight. Minimally intrusive site manipulation was conducted at three heavily oiled mussel beds.
93039	Herring Bay Experimental and Monitoring	ADFG	\$507.5	\$504.6	Draft report due by end of February 1994.	Recovery patterns and rates continued to be monitored and studied experimentally. Recruitment and growth rates of organisms at oiled and unoiled sites were studied relative to currents to test the hypothesis that oil tended to ground on the most productive coastal locations.
93041	Comprehensive Monitoring	NOAA	\$237.9	\$0.0	Request for proposals withheld by Trustee Council.	Not applicable.
93042	Killer Whale Recovery	NOAA	\$127.1	\$113.3	Report being drafted.	AB pod number has increased by one (a calf) to a total of 26. The 14 missing pod members were not present in 1993.
93043	Sea Otter Demographics and Habitat	DOI	\$291.9	\$79.3	Field work and data collected complete; data analylsis and report writing ongoing. Reports will be completed 3/1/94. Habitat component dropped.	Aerial survey of sea otters in Prince William Sound completed Summer 1993; estimated abundance is approximately 18,000. Age distribution of sea otter carcasses recovered in Spring 1993 in western Prince William Sound is similar to prespill distribution. Age- and sex-specific survival rates generated from carcass data for sea otters in Prince William Sound.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	Status	Results and References
93045	Marine Bird / Sea Otter Surveys	DOI	\$262.4	\$257.2	Draft report in internal Fish and Wildlife Service review.	Overall marine bird population estimates in Prince William Sound have not changed significantly since 1989, but were 41% lower than 1972-1973 estimates. Rates of increase of goldeneyes and surfbirds were higher in the unoiled zone of Prince William Sound than in the oiled zone, whereas oystercatchers increased more rapidly in the oiled zone.
93046	Habitat Use, Behavior, and Monitoring of Harbor Seals in PWS (NEPA Compliance)	ADFG	\$233.5	\$215.3	Progress report has been completed.	Counts of seals at 25 trend sites in Prince William Sound were similar during pupping and molting in 1992 and 1993. However, 1993 pupping counts were 23% lower than in 1989. Molting counts were similar to 1989 postspill counts, but 27% lower than 1988 counts. Sixteen seals satellite-tagged since 1992 indicate that seals in central Prince William Sound haul out and feed near the same sites with little movement to other areas. Feeding usually occurs in depths of 100-200 meters, with a maximum recorded dive depth of 404 meters.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
93047	Subtidal Monitoring	ADEC ADFG NOAA	\$1,000.8	\$871.8	Draft final report on 1989-1991 and 1993 due on 6/30/94.	As a follow-up to previous studies from 1989-1991, the numbers and activity of oil-degrading microorganisms were measured in sediments collected in 1993. Preliminary results suggest some contamination remains in subtidal sediments. However, generally very low numbers and activities were found where visible oil was present (e.g., subsurface sediments, Northwest Bay). These results support the hypothesis that populations of oil-degrading microorganisms are good indicators of the presence of biodegradable (e.g., relatively "fresh") oil in Prince William Sound. 1993 infaunal samples
93053	Hydrocarbon Database	NOAA	\$105.5	\$121.4	Report being drafted. Continuation of ST8.	Analyzed several thousand environmental samples, provided numerical correlations directly related to oil, and assessed associations of observed biological effects with concentrations of <i>Exxon Valdez</i> oil.
	1993 Total	9	52,913.0	\$17,691.0		

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Status Report: 1992 Exxon Valdez Oil Spill Restoration Projects DRAFT (for the period March 1, 1992 - February 28, 1993)

<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
Admi	nistration	<i>)</i> 	\$5,076.1	\$3,821.0		
AD	Administrative Director's	s ·	\$2,248.7	\$1,960.0	Ongoing.	Not applicable.
RT	Restoration Team		\$2,827.4	\$1,861.0	Ongoing.	Not applicable.

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<u>DRAFT</u>

<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	Status	Results and References
Dama	ge Assessment		\$7,331.8	\$4,978.3		
ARC00	Archeological Survey	ADNR	\$248.8	\$118.7	Final report accepted.	See Reger, D.R., J.D. McMahon, and C.E. Holmes. 1992. Effect of Crude Oil Contamination on Some Archaeological Sites in the Gulf of Alaska, 1991 Investigations.
AW001	Surface Oil Maps	ADEC	\$17.0	\$8.4	Report overdue.	Maps have been developed depicting the spread of oil on a daily basis for the first three months following the spill.
B002	Boat Surveys	DOI	\$48.5	\$48.5	Report being revised.	Populations of 9 species or species groups (black oystercatcher, pigeon guillemot, cormorants, harlequin duck, loons, scoters, newgull, arctic tern, northwestern crow) declined more than expected in the oiled zone of Prince William Sound suggesting an oil effect. Most injured species were ecologically tied to intertidal or nearshore areas.

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<u>No.</u>	<u>Title</u> <u>A</u>	<u>gencies</u>	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
B004	Eagles Damage Assessment Closeout	DOI	\$60.6	\$60.6	Report revised and submitted for final approval.	Reproductive success of Prince William Sound bald eagles was significantly impaired in 1989, and nest failures were correlated with the distribution of crude oil on beaches. Although estimated direct mortality throughout the spill area was relatively large (about 300 - 900 eagles), no change in the population could be detected due to wide variation in population counts. The Prince William Sound eagle population was expected to return to its prespill level by 1993.
B006	Marbled Murrelets Damage Assessment Closeout	DOI	\$24.8	\$24.8	Report being revised.	The marbled murrelet population at a site within the path of the oil (Naked Island) was lower in 1989 than in prespill years, but returned to normal in 1990. Murrelet numbers in Kachemak Bay where oiling was minimal did not change following the spill.
B007	Storm Petrels Damage Assessment Closeout	DOI	\$7.5	['] \$7.5	Final report accepted.	At the largest storm-petrel colony within the spill trajectory (Barren Islands), no evidence of adverse effects to breeding petrels was found. Burrow occupancy rates were above average, nesting chronology was not delayed, and productivity was normal.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
B008	Kittiwakes Damage Assessment Closeout	DOI	\$7.5	\$7.5	Revised report in review.	The number of breeding pairs did not decline at colonies in the oiled area of Prince William Sound but reproductive success in 1989 was less than expected, apparently due to low hatching success. Reproductive success did not recover by 1992 but whether the decline was due to the spill is unknown.
B009	Pigeon Guillemots Dama Assessment Closeout	ge DOI	\$18.0	\$18.0	Report being revised.	The population at a major breeding site within the spill trajectory (Naked Island) declined by 50% compared to 1972-1973 levels. The long-term decline predated the spill and, therefore, could not be attributed to the spill. Reproduction was largely normal following the spill.
B011	Harlequin Ducks Damage Assessment Closeout	ADFG	\$22.9	\$21.7	Final report in second revision.	Petroleum exposure confirmed in four species of sea ducks. Hydrocarbons in food, liver and bile. Diverse intertidal prey used by ducks. Blue mussels are a key contaminated prey. 1990-1992 low harlequin breeding densities and negligible harlequin stream activity and production in western Prince William Sound. Report not yet accepted.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
B012	Shorebirds Damage Assessment Closeout	DOI	\$20.7	\$20.7	Report revised and submitted for final approval. Revised report in review.	Spring migrant shorebirds (surfbirds and black turnstones) escaped impacts because shorelines used by these species (particularly around Montague Island) were largely unoiled. Black oystercatcher breeding was disrupted and hatching success reduced. Chicks raised on oiled beaches grew more slowly than chicks raised on unoiled beaches, perhaps due to ingestion of contaminated food.
CH001	Coastal Habitat Damage Assessment	USFS	\$2,358.5	\$1,454.7	Final report submitted and in review.	Serious and long-term lasting effects on intertidal algae. Recovery occurring but slow to none in upper intertidal habitat. Full recovery expected. Intertidal invertebrates indicate negative effects from spill. Intertidal fish findings were inconclusive.
CH001	Hydrocarbons in Mussels	NOAA	\$51.4	\$31.1	Report being drafted.	Exxon Valdez oil is located in oiled mussel beds. Mussels are concentrating the oil.
FS001	Spawning Area Injury	ADFG	\$64.3	\$32.8	Report being drafted (combined with R60B).	Documented oil contamination of Prince William Sound pink salmon spawning area. Improved current and historic pink salmon escapement estimates which are necessary for accurate estimates of total wild returns. For preliminary results, see 1989, 1990 and 1991 NRDA Drafts Status Reports.
FS002	Pre-emergent Fry	ADFG	\$29.3	\$11.4	Final report being reviewed.	Measured higher embryo mortalities in oil-contaminated streams than in unoiled streams.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	Status	Results and References
FS003	Coded-Wire Tags Damag Assessment	e ADFG	\$126.7	\$38.7	Final report being reviewed.	Unable to detect significant differences in survival to adults from fry emerging from oiled and control streams. Also unable to detect significant difference in survival of hatchery fish reared in oiled versus unoiled areas of Prince William Sound.
FS004	Early Marine Salmon Damage Assessment	ADFG	\$145.2	\$99.1	Report being revised.	Detected reduced growth and survival of fry rearing in oiled areas in 1989. No significant differences in growth and survival between oiled and nonoiled areas in subsequent years. Rate of adult returns to unoiled hatcheries twice that of oiled hatcheries in 1990.
FS004B	Juvenile Pinks	NOAA	\$119.4	\$121.2	Revised report in review.	Documented exposure and contamination of juvenile salmon in Prince William Sound. Contamination was associated with reduced growth. Ingestion of oil or oiled prey was route of contamination.
FS005	Dolly Varden Damage Assessment	ADFG	\$22.2	\$4.2	Report being revised (combined with R90).	See R90.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
FS011	Herring Injury	ADFG	\$303.6	\$212.2	Report being revised.	Adult herring migrating to the spawning grounds in 1989 were exposed to oil. Exposure to oil continued throughout 1989 and into 1990. Internal tissues were damaged but the short- and long-term effects are speculative. There may have been a short-term effect which inhibited egg deposition and a long-term reproductive impairment (reduced survival of offspring). Eggs were deposited in oiled areas in 1989. Larvae hatched from exposed embryos suffered reduced survival.
FS013	Effects of Hydrocarbons Bivalves	on ADFG	\$75.8	\$51.8	Report being revised.	This study needs more extensive analyses of the data on which the conclusions are based and proper interpretations of the results.

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No.	Title	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
FS027	Sockeye Salmon Overescapement	ADFG	\$630.0	\$354.6	Final report accepted.	Approximately ten- to fifteenfold reduction in Kenai River smolt when compared to brood year 1987. Reduced smolt production from Akalura and Red Lakes, Kodiak Island. Reduced harvests for the Kenai are forecast for 1994 with returns below escapement levels possible for 1995 and 1996. Minimal harvests of Kenai River sockeye salmon are likely. Reduced harvest are forecast for Red and Akalura Lakes for 1994 through 1996. See Schmidt, D.C. and K.E. Tarbox. 1993. Sockeye Salmon Overescapement. State/Federal Natural Resource Damage assessment Status Report. FRED Technical Report 136. 65 pp.; and Schmidt, D.C., J.P. Koenings, and G.B. Kyle. In press. Predator induced changes in diet vertical migration of copepods in Skilak Lake, Alaska; a hypothesis to explain the decrease in overwinter survival of juvenile sockeye salmon (Onchorhynchus nerka).
FS028	Run Reconstruction	ADFG	\$250.6	\$126.4	Report being revised.	Estimated losses to adult populations from oil damages to early life stages at 2 to 3 million in 1990, and 40 to 70 thousand in 1991. Projected losses of 100 to 200 thousand adults in 1993 and 1994.

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<u>No.</u>	<u>Title</u> A	gencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
FS030	Database Management	ADFG	\$202.5	\$151.1	Final report accepted.	Software was written to provide access to fish harvest database using the ADFG commercial fisheries Wide-Area Network (WAN). Procedures were implemented to provide reports in numerous database, spreadsheet, and statistical formats. Documentation and guidelines for using the harvest database were completed. WAN capability is now available between Juneau, Cordova, Anchorage, Kodiak, Soldotna, and Homer. See DiCostanzo, C. and B.P. Simonson. 1993. Database Management. Final Report, State/Federal Natural Resource Damage Assessment. 14 pp.
MM001	Humpback Whales Damage Assessment	NOAA	\$17.3	\$13.6	Report being revised.	No documented injury.
MM002	Killer Whales Damage Assessment	NOAA	\$33.3	\$23.9	Final report accepted.	Whales missing from AB and AT pods. A total of 14 AB pod members lost from 1988-1990 due to unknown causes.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	Status	Results and References
MM006	Sea Otters Damage Assessment	DOI _.	\$199.7	\$199.7	The results of this project will be reported in 17 documents. Six final reports have been accepted. All other reports are being revised.	Direct mortality was probably on the order of 4000 sea otters, and the majority of the mortality probably occurred within Prince William Sound. In late 1991, patterns of mortality, as reflected in a relatively high number of prime-age carcasses, were abnormal compared to prespill patterns. Surveys showed no increase in abundance, and juvenile survival was low in oiled areas of western Prince William Sound. Preliminary data from 1992-1993 indicate some improvement in survival of juvenile and middle-aged sea otters.
ST001	Subtidal Sediments	NOAA	\$103.5	\$96.5	Report being drafted.	Subtidal sediments have been found to be contaminated at no fewer than 15 sites within Prince William Sound by June 1990. Contamination had reached at least 20 meters at some sites. Evidence of hydrocarbon movement downslope into subtidal sediments was detected by 1991.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
ST001	Subtidal Microbial	ADEC	\$17.1	\$3.2	Final report accepted.	The numbers and activity of oil-degrading microorganisms were measured in sediments periodically for two years after the oil spill. Populations of oil-degrading microorganisms were significantly higher in sediments collected at oiled sites relative to reference sites. This information is useful in establishing the extent of contamination of the oil with time and also provides evidence that biodegradation is occurring naturally in Prince William Sound.
ST002	Shallow Benthic	ADFG	\$109.8	\$68.9	Final report being revised.	At oiled sites there was a decrease in some subtidal organisms relative to unoiled sites. Partial recovery observed in 1991.
ST002	Decp Water Benthic	ADFG	\$44.9	\$54.0	Report being revised.	Analyses of 1990 data collected approximately 16 months after the oil spill indicate that the deep benthic environment within the spill region appeared healthy. It appears that movement of water within the region of the oil trajectory was sufficient to flush out toxic fractions, resulting in minimal damage to life at depths of 40 to >100 meters.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
ST003	Caged Mussels Damage Assessment	NOAA	\$39.1	\$24.2	Report being revised.	Mussels transplanted along spill trajectory accumulated particulated oil at concentrations that decreased with depth, elapsed time, and distance from heavily oiled beaches. In 1990 and 1991, low concentrations of polynuclear aromatic hydrocarbons were sporadically detected at locations adjacent to heavily oiled beaches. Petroleum hydrocarbons were detected only sporadically in mussels deployed in locations outside Prince William Sound in 1989.
ST003	Sediment Traps Damage Assessment	ADEC	\$50.9	\$24.5	Report being drafted.	The subtidal sediment trap study demonstrated that oiled particulated matter derived from oil-impacted beaches in Prince William Sound contaminated adjacent subtidal sediments. The study further showed that the transfer rate of oil from beach to subtidal sediment was highest the year following the spill, and declined steadily thereafter.
ST004	Fate and Toxicity Damag Assessment	ge NOAA	\$52.6	\$55.1	Report returned for revision.	Results indicate that some toxicity was still associated in 1990 and 1991 with sediments from lower intertidal zones of heavily oiled sites. The fate of <i>Exxon Valdez</i> oil will include transformation of most constituents (through biodegradation and photooxidation) mainly into carbon dioxide and water, although some constituents may persist indefinitely.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
ST005	Shrimp	ADFG	\$47.7	\$15.9	Final report accepted.	Hydrocarbon analyses did not detect oil contamination with sampled spot shrimp. Shrimp collected in unoiled areas had more inflammatory gill lesions than did shrimp from the oiled area. These results indicate that oil contamination had little or no effect on spot shrimp.
ST006	Rockfish Damage Assessment	ADFG	\$16.6	\$17.3	Final report being revised.	Oil was determined to be the cause of death for a small number of demersal rockfish in Prince William Sound. Dead and dying rockfish were reported from the spill area. Of the five fish that were fresh enough to be necropsied, exposure to crude oil was found to be the cause of death. These results prompted additional testing for hydrocarbons in live fish. These tests showed at least 11 of 36 rockfish tested from oiled sites had been exposed to oil within 2 weeks prior to testing. None of the 13 fish from unoiled sites were exposed to oil. Subsequent studies showed some indications of sublethal injuries to rockfish from exposure to oil.
ST007	Demersal Fishes Damage Assessment	∵ NOAA	\$60.4	\$55.1	Report being reviewed.	Results show continuing exposure of several benthic fish species and pollock, suggesting continuing petroleum contamination of subtidal sediments, water and food in 1990 and 1991 at sites up to 400 miles from the spill origin.

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	. A		Amount Budgeted*	Amount Spent*	Status	Decide and Deference
<u>No.</u>	Title A	gencies	Diageica	Spent	<u>Status</u>	Results and References
ST008	Sediment Data Synthesis	NOAA	\$205.6	\$168.2	Report being drafted. Project continued as 93053,	Analyzed several thousand environmental samples, provided numerical correlations directly related to oil, and assessed associations of observed biological effects with concentrations of Exxon Valdez oil.
TM003	River Otter and Mink Damage Assessment in Prince William Sound	ADFG	\$74.0	\$16.1	Report being revised.	The results indicate that differences in home range, habitat selection, and latrine site abandonment, as well as changes in food habits, occurred in river otters.
TS001	Hydrocarbon Analysis	NOAA DOI	\$1,028.3	\$847.6	Report being reviewed.	Coordinated the chemical analysis of all samples collected by damage assessment studies to develop a single set of analytical data comparable across projects.
TS003	GIS Mapping and Analysis: Damage Assessment	ADNR DOI	\$375.2	\$268.8	Completed. No report necessary.	Provided mapping and database support for damage assessment projects.

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<u>No.</u>	<u>Title</u> A	agencies	Amount Budgeted*	Amount Spent*	Status	Results and References
Gener	al Restoration	,	\$4,097.4	\$3,077.2		
R053	Kenai River Sockeye Salmon Restoration	ADFG	\$674.2	\$434.6	Report being revised.	Successful collection of baseline and fishery samples for genetic stock identification. Unsuccessful in choosing new adult inriver hydroacoustic equipment. Successful hydroacoustic enumeration of returning adult salmon in Upper Cook Inlet.
R0 5 9	Genetic Stock Identification	n ADFG	\$320.9	\$257.2	Report being revised.	Genetic data were collected during 1992 from spawning populations contributing to mixed-stock harvests of sockeye salmon in Cook Inlet. These data can be used to estimate the presence of Kenai River stocks in mixed-stock areas of Upper Cook Inlet.
R060A	Prince William Sound Pink Salmon	ADFG	\$1,479.7	\$1,204.3	Final R60A report being revised. R60C report being drafted (combined with FS1).	The CWT program (R60A) helped reduce the commercial harvest on damaged pink salmon populations by providing fishery managers with timely inseason fishery stock composition estimates. The escapement project (R60B) provided improved pink salmon escapement information which was essential for the precise fisheries management required to protect damaged wild stocks.

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R073.	Harbor Seals .	ADFG	\$25.0	\$2.5	No final report for R73. A final report for MM5 is being reviewed.	Harbor seals continue to use heavily oiled haulouts even when unoiled sites were available nearby. They were observed to give birth and care for their pups on these sites. The pelage of both pups and adults became oiled when they used these sites or contacted oil in the water. however, the pelage became cleaner with time if they did not continue to use oiled sites. Many carcasses recovered were either stillborn or died shortly after birth. Observations suggest that stress and/or toxic effects of oil resulted in abortions, premature births, and increased mortalities in heavily oiled areas.
R092	GIS Mapping and Analysis: Restoration	ADNR DOI	\$125.5	\$105.4	Completed. No report necessary.	Provided mapping and database support for restoration projects. Developed timber harvest database and land status and parcel maps for imminent threat parcels. Contributed to a 3-volume data dictionary produced for the Trustee Council by the Nature Conservancy.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	Status	Results and References
R103	Oiled Mussels	ADFG NOAA DOI	\$874.0	\$740.1	Report being revised. Project continued as 93036.	Identified 27 mussel beds with total petroleum hydrocarbons greater than 10,000 mg/g wet weight. Minimally intrusive site manipulation was conducted at three heavily oiled mussel beds. Black oystercatchers fed in oiled mussel beds. Chicks raised on oiled sites grew more slowly than chicks raised on unoiled sites. Differences in levels of blood haptoglobin and Interleukin-6 ir, which were previously found to be elevated in river otters inhabiting oiled compared to nonoiled areas in Prince William Sound, were not observed in Summer 1992. Additionally, river otters from oiled areas continued to regain body size from levels noted in 1990. This suggests that river otters may be recovering from chronic effects that were observed in 1990 and 1991. Consequently, no adverse effects in 1992 could be attributed to oiled mussel beds from areas where river otters were captured.
R104A	Site Stewardship	ADNR USFS	\$159.2	\$114.1	Project is complete. Report awaiting final review.	Increased public knowledge of archaeological sites following the spill led to increased vandalism. A stewardship program to train local residents to protect cultural resources was developed. A site stewardship manual and field notebook were written.

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<u>No.</u>	<u>Title</u> <u>A</u>	gencies	Amount Budgeted*	Amount Spent*	Status	Results and References
R105	Instream Survey Restoration Implementation Planning	ADFG USFS	\$348.1	\$148.5	Final report in preparation, USFS transmitted report to Chief Scientist.	Results of Cost:Benefit Study Implementation has been integrated and design planning has been completed. Awaiting construction funding. Cost:Benefit analysis for improved barrier bypass for Little Waterfall Creek on Afognak Island is positive.
R106	Dolly Varden Restoration	ADFG	\$34.9	\$16.2	Final report being revised.	The nature and extent of injury to Dolly Varden and cutthroat trout was documented in FS5. The goal of R106 was to provide information for developing a management plan to protect impacted stocks, while allowing for continued recreational fishing for sport anglers where stocks could support fisheries. Sixty-one streams were surveyed to provide this information.
R113	Red Lake Sockeye Salmon Restoration	ADFG	\$55.9	\$54.3	Report being reviewed.	Red Lake does not need restoration effort but Ayakulik does.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
Habitat Protection			\$1,319.1	\$1,027.7		
B003	Murres Damage Assessment Closeout	DOI	\$75.7	\$75.7	Final report accepted.	Numbers were reduced, nesting was delayed, and productivity rates were far below normal at major colonies within the spill trajectory. Reproductive success improved slightly in 1991.
R015	Marbled Murrelet Restoration Study	DOI	\$419.3	\$428.5	Annual progress report reviewed.	Using ground search techniques, 10 tree nests were found on Naked Island in 1991 and 1992. Nest trees were in stands of high volume and size class trees, and upland activity of murrelets throughout Prince William Sound was highest in such stands.
R047	Stream Habitat Assessm	ent ADFG	\$399.6	\$323.9	Final report accepted.	About 250 km of shoreline and 260 km ² of uplands were surveyed for anadromous fish streams on private lands on Afognak Island, resulting in discovery of 167 anadromous streams totaling about 56 km. Stream habitat parameters and upper extents of anadromous distribution were documented, and streams were mapped by GPS. Kuwada, M. and K. Sundet. 1993. Stream Habitat Assessment Project: Afognak Island. Habitat and Restoration Division Technical Report No. 93-3, Exxon Valdez Restoration and Habitat Protection Planning. 104 pp.

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oiled mussel beds identified.

<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	Status	Results and References
R071	Harlequin Duck Restor and Monitoring	ation ADFG	\$424.5	\$199,6	Report being revised.	Comparative harlequin data in eastern Prince William Sound for B11. 1991-1992 harlequin production in eastern Prince William Sound similar to prespill. Techniques devised to capture and track harlequins. Breeding stream parameters and nest sites described. Additional

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
Monit	toring and Research		\$1,386.6	\$985.4	·	
R011	Murre Recovery Monito	ring. DOI	\$316.7	\$274.0	Report being revised.	Numbers of murres breeding at major colonies within the trajectory remained lower in 1992. Breeding chronology was delayed. Productivity at the Barren Islands was higher than in other postspill years, but still lower than normal. Productivity at Puale Bay was normal.
R060C	Pink Salmon Egg/Fry	ADFG NOAA	\$492.8	\$352.9	Report being revised. Project continued as 93003. Expected to be continued into 1994 and 1995.	Oil exposures completed for 1992 and 1993 brood years. Persistence of elevated mortalities among embryos in oiled streams versus those in nonoiled streams suggests genetic damage. Spawning of surviving adults is scheduled for September 1994 with possible long-term genetic damage and survival of progeny to be determined in early 1995.

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<u>No.</u>	<u>Title</u>	Agencies	Amount Budgeted*	Amount Spent*	<u>Status</u>	Results and References
R090	Dolly Varden Char Monitoring	ADFG	\$91.5	\$34.2	Report being revised (combined with FS5).	Two populations of Dolly Varden and cutthroat trout emigrated from lakes into the wake of the spill. Growth from 1989-1990 was 24% and 22% slower for recaptured subadult and adult Dolly Varden and 36% to 43% slower for subadult and adult populations of cutthroat trout in populations associated with the oil. This difference persisted through 1991 for cutthroat trout but not for Dolly Varden. Chronic starvation and direct exposure to petrogenic hydrocarbons were hypothesized as effects leading to reduced growth and accelerated mortality of both Dolly Varden and cutthroat trout.
R102	Herring Bay Experiments and Monitoring Study	al ADFG	\$485.6	\$324.3	Report being revised.	Cover of the dominant intertidal alga, Fucus gardneri, was reduced at oiled/cleaned sites. Fucus recruitment was poor in the mid- to upper intertidal, probably due to lack of shelter from desiccation and heating by adult plants. Limpet densities continued to be lower in the upper intertidal. Recovery appeared to be occurring in the lower intertidal zone in 1990-1991 and in the upper intertidal in 1993. Results have been incorporated into an interaction web to elucidate potential oil spill effects on community dynamics.

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No. Title Agencies Budgeted* Spent* Status Results and References

1992 Total

\$19,211.0 \$13,889.6

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